

Nakamichi

# Service Manual

## Nakamichi BlackBox Series

|        |                      |
|--------|----------------------|
| PS-100 | Power Supply         |
| SF-100 | Sub-sonic Filter     |
| LA-100 | Line Amplifier       |
| BA-150 | Bridging Adaptor     |
| MB-150 | MC Booster Amplifier |
| EC-100 | Electronic Crossover |
| MX-100 | Microphone Mixer     |

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## 1. PS-100 POWER SUPPLY

## General

## PS-100 Power Supply

PS-100 is a regulated power supply unit designed to be a power supply for the BlackBox Series (the rated output current:  $\pm 200$  mA).

Although PS-100 is provided only with one output terminal, two input/output terminals on the other units of the BlackBox Series make multiple connection of PS-100 possible.

To prevent noise signal generation on switching ON/OFF the power supply, PS-100 produces a mute signal, muting output terminals of each unit furnished with a muting circuit.

Refer to Table 1 showing how many units of the BlackBox Series can be driven by a single PS-100.

## Mute Signal

Mute signal is muted for a certain period of time to prevent transient noise when power is ON or OFF.

## Power ON

Transformer output is rectified through diode D403 and smoothed by capacitor C408. Therefore, positive potential appears at C408 (transistor Q411 base). Accordingly, Q411 is in the cutoff state. C409 (22  $\mu$ F) is charged with negative potential through R414 (1 M $\Omega$ ), therefore at the level where the voltage across C409 exceeds Vbe (base-emitter voltage) of Q412, Q412 turns from OFF to ON.

As a result, Q413 turns on and the mute signal is changed from + V to -10 V, releasing the mute state.

(The mute time depends on C409 and R414 after power is ON.)

## Power OFF

Transformer output becomes zero and so C408 is charged with negative potential through R415. At the level where the voltage across C408 exceeds Vbe of Q411, Q411 turns from OFF to ON and C409 is quickly discharged. Thus, Q412 is cut off and Q413 is also cut off. Therefore the mute signal becomes + V (i.e. mute state). D402 acts to prevent + V from being discharged easily when power is OFF.

## Specifications

|                                 |  |
|---------------------------------|--|
| Maximum Power Consumption . . . | 20 VA  |
| Output Voltage . . . . .        | $\pm 10$ V   |
| Rated Output Current . . . . .  | $\pm 200$ mA   |
| Dimensions . . . . .            | 7-1/2(W) x 2-3/8(H) x 3-15/16(D) inches<br>190(W) x 60(H) x 99(D) mm |
| Weight . . . . .                | 3.5 lb, 1.6 kg   |

Table 1 Combinations of Units Driven by a single PS-100

| Type                             | PS-100<br>Power Supply | SF-100<br>Sub-sonic Filter | LA-100<br>Line Amplifier | BA-150<br>Bridging Adaptor | MB-150<br>MC Booster Amplifier | EC-100<br>Electronic Crossover | MX-100<br>Microphone Mixer |
|----------------------------------|------------------------|----------------------------|--------------------------|----------------------------|--------------------------------|--------------------------------|----------------------------|
| Rating                           | 4 VA<br>(±200 mA)      | 0.5 VA<br>(±25 mA)         | 0.5 VA<br>(±25 mA)       | 1 VA<br>(±50 mA)           | 2 VA<br>(±100 mA)              | 1 VA<br>(±50 mA)               | 2 VA<br>(±100 mA)          |
| Combination                      | 1                      | ○                          | ○                        | ○                          | ○                              |                                |                            |
|                                  | 2                      | ○                          | ○                        | ○                          |                                |                                | ○                          |
|                                  | 3                      | ○                          | ○                        |                            |                                | ○                              | ○                          |
|                                  | 4                      | ○                          | ○                        |                            | ○                              | ○                              |                            |
|                                  | 5                      |                            |                          | ○                          | ○                              | ○                              |                            |
|                                  | 6                      |                            |                          | ○                          |                                | ○                              | ○                          |
|                                  | 7                      |                            |                          |                            | ○                              |                                | ○                          |
| Maximum Drivable Number of Units |                        | 8                          | 8                        | 4                          | 2                              | 4                              | 2                          |

## Schematic Diagram

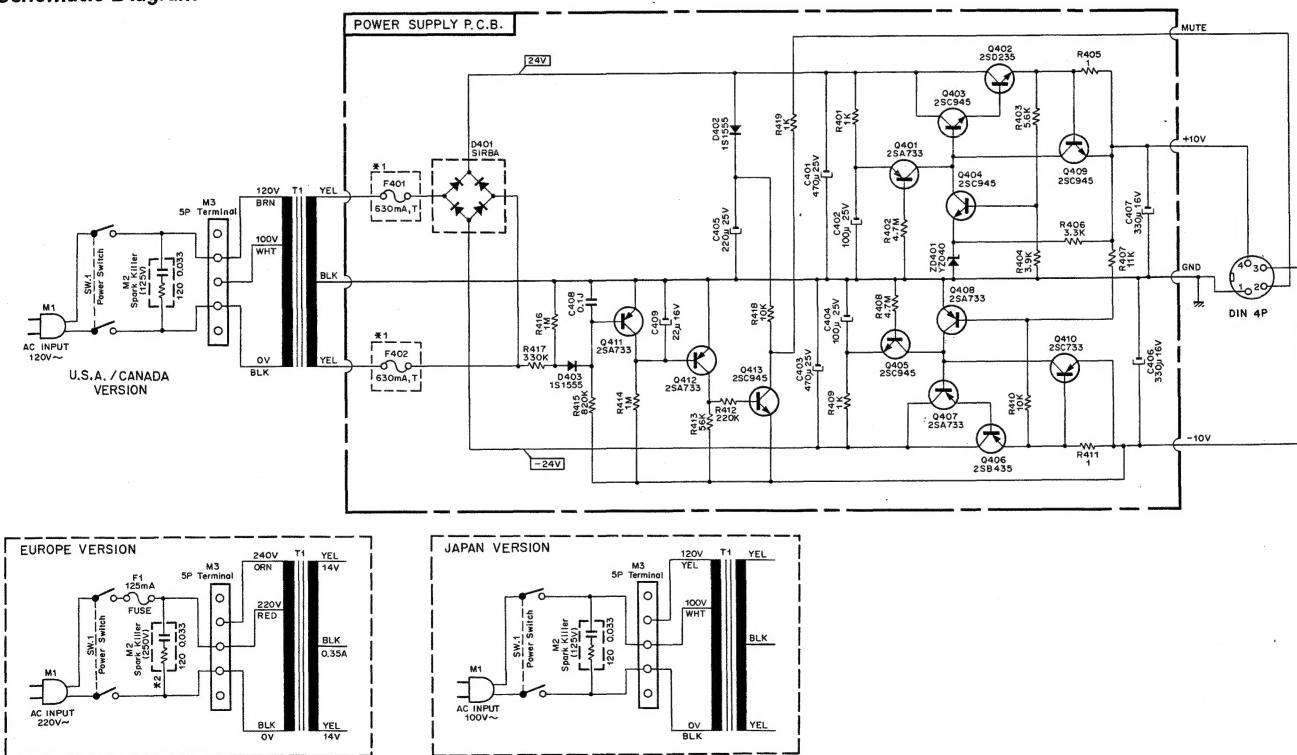


Fig. 1.1

Notes: 1. Fuses marked with \*1 are not incorporated in the U.S.A. version.  
2. The type of spark killer marked with \*2 differs in some countries.

## Mounting Diagram and Parts List

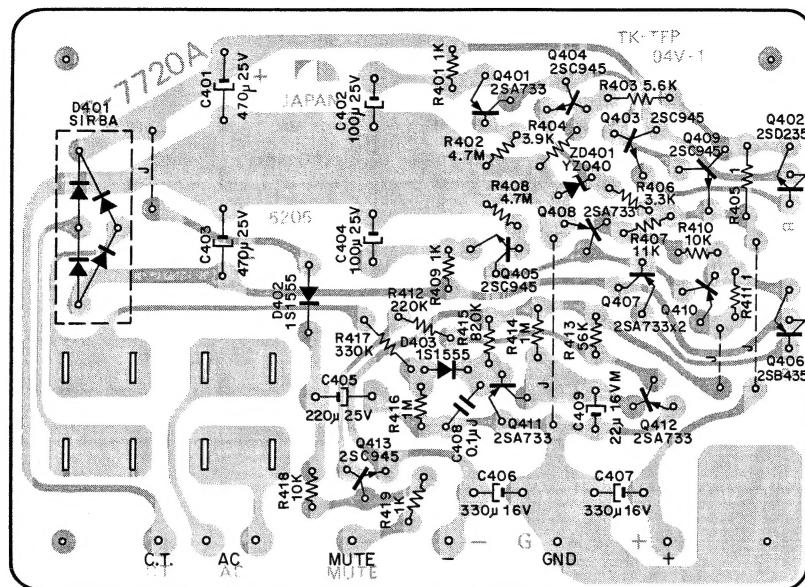


Fig. 1.2

| Schematic Ref. No. | Part No. | Description            |                | Schematic Ref. No. | Part No. | Description                               |                 |
|--------------------|----------|------------------------|----------------|--------------------|----------|---|-----------------|
|                    | BA03855A | PS-100 P.C.B. Ass'y    |                | C405               | OB01391A | Electrolytic Capacitor                    |                 |
|                    | OB07720A | Power Supply P.C.B.    |                | C406,407           | OB01502A | Electrolytic Capacitor                    |                 |
|                    | OB06013A | Transistor             | 2SA733         | C408               | OB01780A | 330 $\mu$                                 | 16V             |
| Q401,407           |          |                        |                | C409               | OB05820A | Mylar Capacitor                           | 0.1 $\mu$ 50V J |
| 408,410            |          |                        |                |                    |          | Electrolytic Capacitor                    |                 |
| 411,412            |          |                        |                |                    |          | 22 $\mu$                                  | 16V M (MS)      |
| Q402               | OB01823A | Transistor             | 2SD235 (Y)     |                    | OJ03597B | Heat Sink                                 | (1 pce.)        |
| Q403,404           | OB01872A | Transistor             | 2SC945         |                    | OE00607A | Screw M3x8 Philips Pan Head (3A) (4 pcs.) |                 |
| 405,409            |          |                        |                |                    | OE00507A | Nut Hex. M3                               | (2 pcs.)        |
| 413                |          |                        |                |                    |          |   |                 |
| Q406               | OB06011A | Transistor             | 2SB435         |                    |          |   |                 |
| D401               | OB06088A | Silicon Diode          | S1RBA          |                    |          |   |                 |
| D402,403           | OB01909A | Silicon Diode          | 1S1555         |                    |          |   |                 |
| ZD401              | OB06063A | Zener Diode            | YZ040B         |                    |          |   |                 |
| R401,409           | OB01781A | Carbon Resistor        | 1K ERD-25V J   |                    |          |   |                 |
| 419                |          |                        |                |                    |          |   |                 |
| R402,408           | OB05824A | Carbon Resistor        | 4.7M ERD-50T J |                    |          |   |                 |
| R403               | OB05673A | Carbon Resistor        | 5.6K ERD-25V J |                    |          |   |                 |
| R404               | OB05664A | Carbon Resistor        | 3.9K ERD-25V J |                    |          |   |                 |
| R405,411           | OB05746A | Carbon Resistor        | 1 ERD-25V J    |                    |          |   |                 |
| R406               | OB01793A | Carbon Resistor        | 3.3K ERD-25V J |                    |          |   |                 |
| R407               | OB05826A | Carbon Resistor        | 11K ERD-25V J  |                    |          |   |                 |
| R410,418           | OB01833A | Carbon Resistor        | 10K ERD-25V J  |                    |          |   |                 |
| R412               | OB05596A | Carbon Resistor        | 220K ERD-25V J |                    |          |   |                 |
| R413               | OB05563A | Carbon Resistor        | 56K ERD-25V J  |                    |          |   |                 |
| R414,416           | OB05564A | Carbon Resistor        | 1M ERD-25V J   |                    |          |   |                 |
| R415               | OB05674A | Carbon Resistor        | 820K ERD-25V J |                    |          |   |                 |
| R417               | OB01921A | Carbon Resistor        | 330K ERD-25V J |                    |          |   |                 |
| C401,403           | OB01401A | Electrolytic Capacitor |                |                    |          |   |                 |
|                    |          |                        | 470 $\mu$ 25V  |                    |          |   |                 |
| C402,404           | OB01272A | Electrolytic Capacitor |                |                    |          |   |                 |
|                    |          |                        | 100 $\mu$ 25V  |                    |          |   |                 |

## Mechanism Ass'y and Parts List

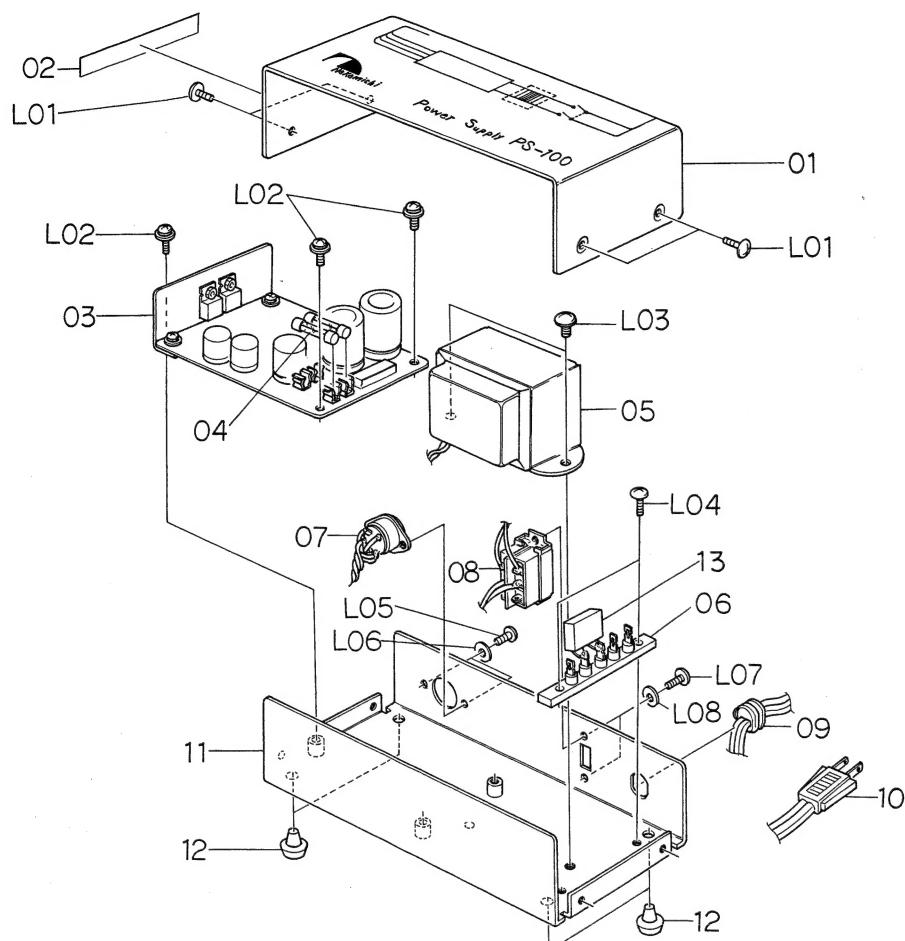


Fig. 1.3

| Schematic Ref. No. | Part No. | Description                 | Q'ty | Schematic Ref. No. | Part No. | Description                       | Q'ty |
|--------------------|----------|-----------------------------|------|--------------------|----------|-----------------------------------|------|
|                    |          | <b>PS-100 Mechanism</b>     |      |                    | 11       | HA03697C                          | 1    |
| 01                 | 0H03509A | Upper Cover PS              | 1    | 12                 | 0H03437A | Rubber Foot                       | 4    |
| 02                 | 0M03799A | Caution Label G             | 1    | 13                 | 0B08361A | Spark Killer 125 V (R + C)        | 1    |
|                    | 0M03800A | Caution Label H             | 1    |                    | 0B08363A | Spark Killer 125 V (R + C)        | 1    |
| 03                 | BA03855A | PS-100 P.C.B. Ass'y         | 1    |                    | 0B08342A | Spark Killer 125 V (R + C)        | 1    |
| 04                 | OB08161U | Fuse 630 mA                 | 2    |                    | 0B08240A | Spark Killer 250 V (R + C)        | 1    |
| 05                 | OB06567A | Power Transformer 100-120 V | 1    | 14                 | OB07096U | Spark Killer (C)                  | 1    |
|                    | OB06568A | Power Transformer 220-240 V | 1    | 15                 | 0E00713A | Screw M3x6 Philips Truss Head     | 4    |
| 06                 | OB08025U | 5P Terminal                 | 1    | 16                 | 0E00606A | Screw M3x6 Philips Pan Head (3A)  | 3    |
| 07                 | OB08355A | 4P DIN Socket               | 1    | 17                 | 0E00538A | Screw M4x5 Philips Binding Head   | 2    |
| 08                 | OB07172A | Power Switch                | 1    | 18                 | 0E00594A | Screw M3x8 Philips Binding Head   | 2    |
|                    | OB07092A | Power Switch                | 1    | 19                 | 0E00714A | Screw M2.6x6 Philips Binding Head | 2    |
| 09                 | OB08037A | Cord Bushing                | 1    | 20                 | 0E00651A | Washer 2.6 mm (plastics)          | 2    |
|                    | OB08351A | Cord Bushing                | 1    | 21                 | 0E00593A | Screw M3x6 Philips Binding Head   | 2    |
|                    | OB08325A | Cord Bushing                | 1    | 22                 | 0E00157A | Washer 3 mm (plastics)            | 2    |
| 10                 | OB08350A | Power Cord                  | 1    |                    |          |                                   |      |
|                    | OB08219B | Power Cord                  | 1    |                    |          |                                   |      |
|                    | OB08348A | Power Cord                  | 1    |                    |          |                                   |      |
|                    | OB08149U | Power Cord                  | 1    |                    |          |                                   |      |

Notes: 1. 02, 08, 09 and 10 differ in versions.  
2. 04 (fuse) is not incorporated in the U.S.A. version.

## 2. SF-100 SUB-SONIC FILTER

## General

In disc record reproduction, low-frequency resonance of a tone arm and rumbling of a turn table exist at about 10 Hz and their peak level ranges approximately from 5 to 15 dB.

SF-100 is an active filter to eliminate these noises.

The unit is designed so that no low frequency sound recorded on disc records is sacrificed and no change in tones is effected.

To compensate the personal feeling of insufficiency in low frequency sound caused by the insertion of the Sub-sonic Filter, a Low Boost Switch is provided which can boost signal approximately by 5 dB at 30 Hz.

With both of the Filter Switch and Low Boost Switch turned OFF, the input signal directly appears on the output terminals without passing through the Sub-sonic Filter.

The output of the twin-T filter is amplified by Amplifier 2, while the output of the amplifier is positively fed back through  $C_2$  and  $R_2$  to compensate the level reduction in the range of 20–50 Hz.

Further, to increase the attenuation below 5 Hz, the filter load impedance is lowered with  $R_4$ , and the improvement of characteristics can be realized by changing impedance of every device.

In addition, a high pass filter is incorporated in the input side of Amplifier 1 to ensure an ideal sub-sonic filtering characteristics.

## Specifications

|                                     |  |
|-------------------------------------|--|
| Maximum Power Consumption . . . . . | 0.5 VA   |
| Current Consumption . . . . .       | 25 mA  |
| Total Harmonic Distortion . . . . . | less than 0.005% (50 Hz – 20 kHz, 1 V Output)                        |
| Frequency Response . . . . .        | 40 Hz – 100 kHz $\pm$ 0.5 dB   |
| Sub-sonic Filter . . . . .          | 10 Hz: –50 dB,<br>–40 dB (with Low Boost)                            |
| Low Boost . . . . .                 | 30 Hz: + 5 dB  |
| Signal-to-Noise Ratio . . . . .     | better than 110 dB (IHF-A Network)                                   |
| Mute Function . . . . .             | Furnished  |
| Dimensions . . . . .                | 7-1/2(W) x 2-3/8(H) x 4-1/16(D) inches<br>190(W) x 60(H) x 103(D) mm |
| Weight . . . . .                    | 2.7 lb, 1.2 kg   |

## System Diagram

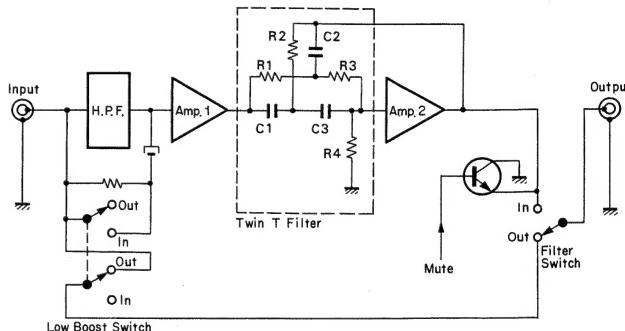


Fig. 2.1

| Schematic Ref. No.               | Part No.                         | Description  | Schematic Ref. No.              | Part No.                         | Description  |
|----------------------------------|----------------------------------|--|---------------------------------|----------------------------------|--|
|                                  | BA03849A                         | SF-100 P.C.B. Ass'y  | R114,115<br>119,214<br>215,219  | 0B05562A                         | Carbon Resistor 47K ERD-25V J  |
| Q101,102<br>201,202              | 0B07719A<br>0B06062A             | SF P.C.B.<br>Transistor 2SC1222 (2)  | R116,216<br>R117,118<br>217,218 | 0B05678A<br>0B05567A             | Carbon Resistor 560 ERD-25V J<br>Carbon Resistor 33 ERD-25V J                    |
| Q103,104<br>203,204              | 0B06013A                         | Transistor 2SA733  | C101,201<br>C102,202            | 0B05682A<br>0B01863A             | Mylar Capacitor 0.068 $\mu$ 50V J<br>Electrolytic Capacitor 3.3 $\mu$ 16V        |
| Q105,205                         | 0B01872A                         | Transistor 2SC945 (L)  | C103,105<br>203,205             | 0B05844A                         | Mylar Capacitor 0.33 $\mu$ 50V J   |
| D101,102<br>103,201<br>202,203   | 0B01909A                         | Silicon Diode 1S1555   | C104,204<br>C106,206            | 0B05832A<br>0B05639A             | Mylar Capacitor 0.018 $\mu$ 50V J<br>Electrolytic Capacitor 1.5 $\mu$ 35V M (MS) |
| R101,201<br>R102,202<br>R103,203 | 0B05700A<br>0B05564A<br>0B05563A | Carbon Resistor 470K ERD-25V J<br>Carbon Resistor 1M ERD-25V J<br>Carbon Resistor 56K ERD-25V J  | C107,108<br>207,208             | 0B05884A                         | Electrolytic Capacitor 470 $\mu$ 10V   |
| R104,204<br>R105,205<br>R106,206 | 0B05608A<br>0B01789A<br>0B05664A | Carbon Resistor 220 ERD-25V J<br>Carbon Resistor 330 ERD-25V J<br>Carbon Resistor 3.9K ERD-25V J | CN1<br>CN2                      | 0B07167A<br>0B08182A<br>0B08236A | Push Switch (1 pce.)<br>6P-T Post<br>4P-T Post                                   |
| R107,207<br>R108,109<br>208,209  | 0B01564A<br>0B01921A             | Carbon Resistor 82K ERD-25V J<br>Carbon Resistor 330K ERD-25V J                                  |                                 |                                  |  |
| R110,210<br>R111,211<br>R112,212 | 0B01795A<br>0B01902A<br>0B05569A | Carbon Resistor 4.7K ERD-25V J<br>Carbon Resistor 68K ERD-25V J<br>Carbon Resistor 47 ERD-25V J  |                                 |                                  |  |
| R113,213                         | 0B05565A                         | Carbon Resistor 1.2K ERD-25V J   |                                 |                                  |  |

## Schematic Diagram

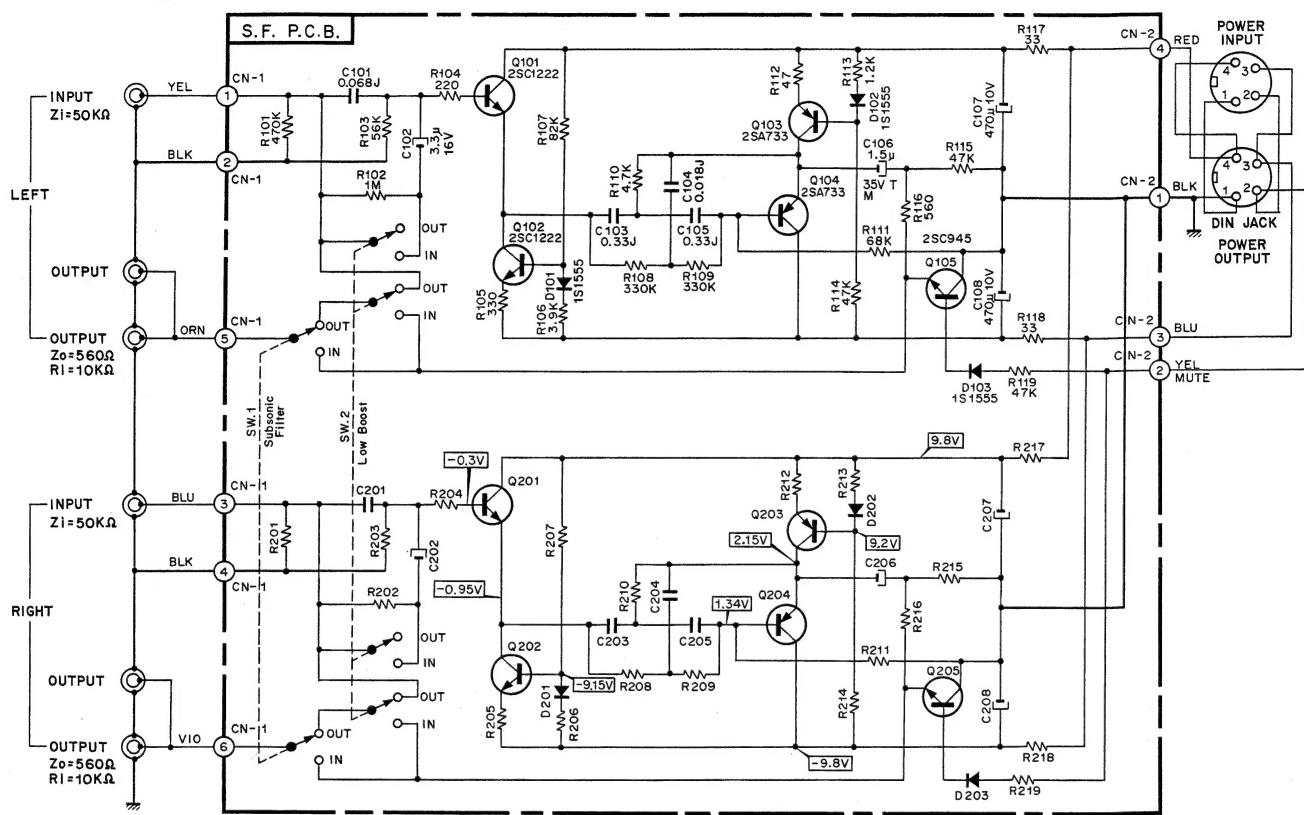


Fig. 2.2

## Mounting Diagram and Parts List

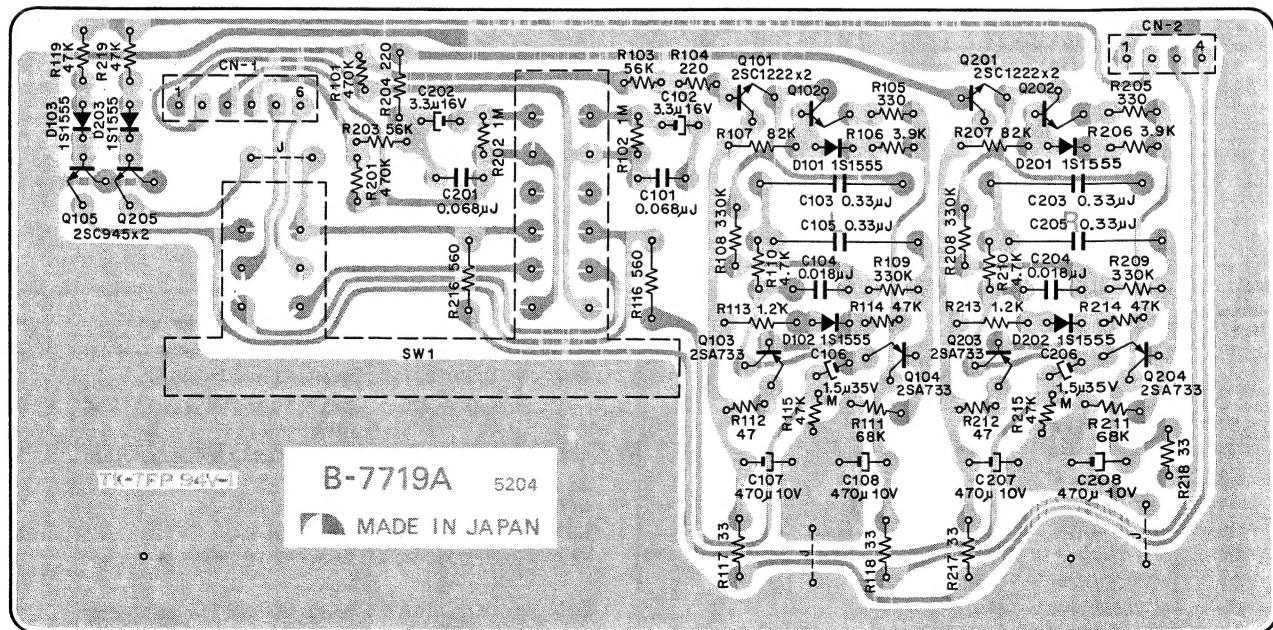


Fig. 2.3

## Mechanism Ass'y and Parts List

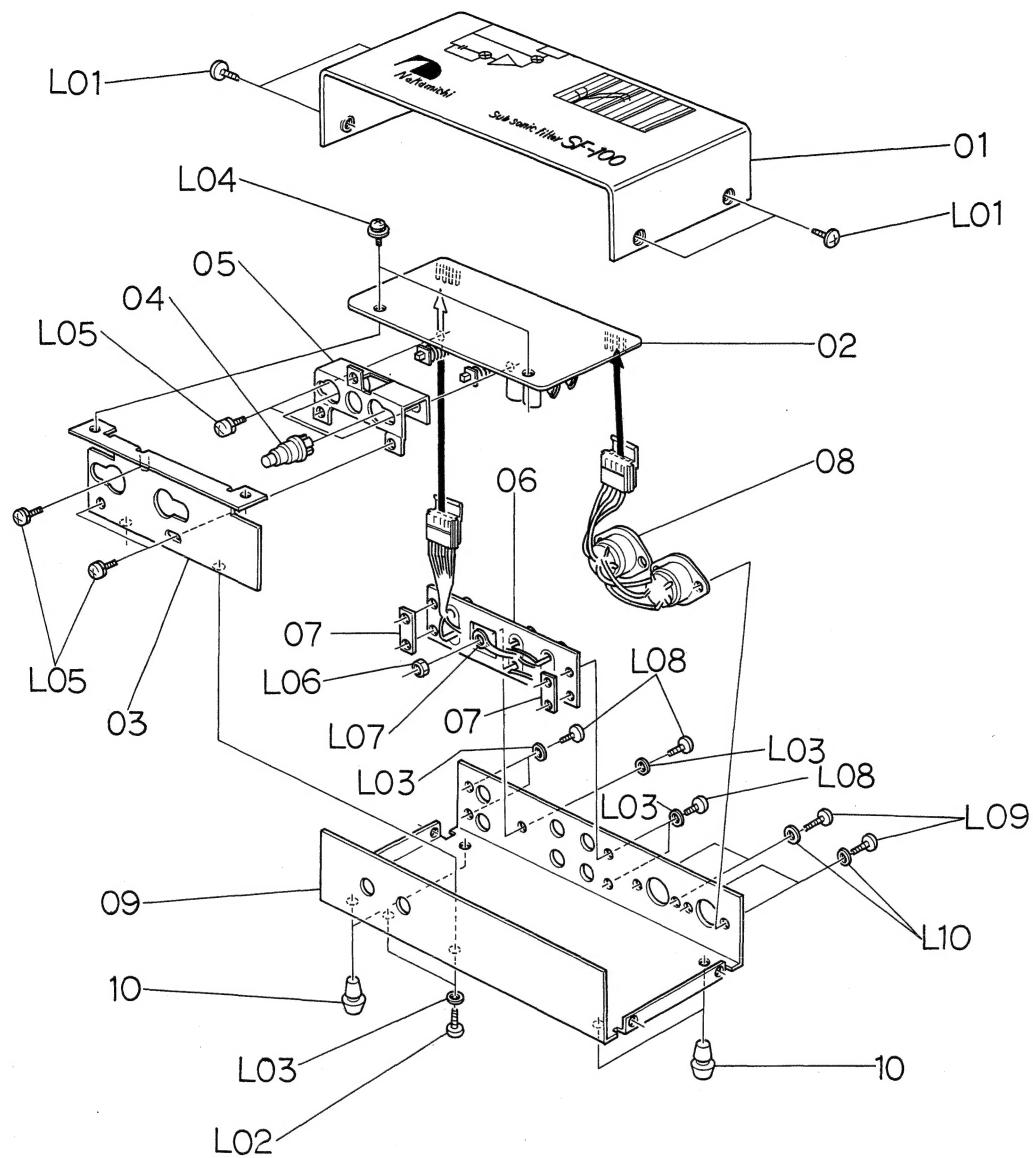


Fig. 2.4

| Schematic Ref. No. | Part No. | Description                     | Q'ty | Schematic Ref. No. | Part No. | Description                       | Q'ty     |
|--------------------|----------|---------------------------------|------|--------------------|----------|-----------------------------------|----------|
| <b>01</b>          | 0H03507A | <b>SF-100 Mechanism</b>         |      | <b>L03</b>         | 0E00157A | Washer 3 mm (plastics)            | <b>7</b> |
| 02                 | BA03849A | Upper Cover SF                  | 1    | <b>L04</b>         | 0E00606A | Screw M3x6 Philips Pan Head (3A)  | <b>2</b> |
| 03                 | 0J03654B | SF-100 P.C.B. Ass'y             | 1    | <b>L05</b>         | 0E00612A | Screw M3x6 Philips Pan Head (2A)  | <b>5</b> |
| 04                 | JA03061A | Front Chassis                   | 1    | <b>L06</b>         | 0E00507A | Nut Hex. M3                       | <b>1</b> |
| 05                 | 0J03440A | Push Button Ass'y               | 2    | <b>L07</b>         | 0E00037A | Earth Lug B-5                     | <b>1</b> |
| 06                 | 0B08290B | Switch E Block Base             | 1    | <b>L08</b>         | 0E00594A | Screw M3x8 Philips Binding Head   | <b>5</b> |
| 07                 | 0J03277A | 6P Pin Jack                     | 1    | <b>L09</b>         | 0E00714A | Screw M2.6x6 Philips Binding Head | <b>4</b> |
| 08                 | 0B08355A | Metal Seat Nut                  | 2    | <b>L10</b>         | 0E00651A | Washer 2.6 mm (plastics)          | <b>4</b> |
| 09                 | 0H03508B | 4P DIN Socket                   | 2    |                    |          |                                   |          |
| 10                 | 0H03437A | Main Chassis SF                 | 1    |                    |          |                                   |          |
| L01                | 0E00713A | Rubber Foot                     | 4    |                    |          |                                   |          |
| L02                | 0E00593A | Screw M3x6 Philips Truss Head   | 4    |                    |          |                                   |          |
|                    |          | Screw M3x6 Philips Binding Head | 2    |                    |          |                                   |          |

### 3. LA-100 LINE AMPLIFIER

## General

LA-100 is an amplifier with a flat frequency response that may be inserted between amplifiers connected to input or output of a tape deck or the like when the gain of the amplifiers is insufficient.

The gain is selectable at four levels, 0, +6, +12, and +18 dB by combination of IN/OUT of two gain switches of 6 dB and 12 dB.

The voltage amplification of LA-100 at each status of the switches is as follows:

$S_1$ : open,  $S_2$ : close;

$$A_{V(1)} = \frac{9.1 \text{ k} // 27 \text{ k}}{6.8 \text{ k}} \doteq 1 \text{ [0 dB]}$$

$S_1$  : close,  $S_2$  : close;

$$A_{v(2)} = \frac{9.1 \text{ k} // 27 \text{ k}}{6.8 \text{ k} // 6.8 \text{ k}} \doteq 2 \quad [6 \text{ dB}]$$

$S_1$ : open,  $S_2$ : open;

$$A_{v(3)} = \frac{(1M + 9.1\text{ k}) // 27\text{ k}}{6.8\text{ k}} \doteq 4 \quad [12\text{ dB}]$$

$S_1$ : close,  $S_2$ : open;

$$A_{V(4)} = \frac{(1M + 9.1\text{ k}) // 27\text{ k}}{6.8\text{ k} // 6.8\text{ k}} \doteq 8 \quad [18\text{ dB}]$$

## Specifications

|                                     |   |
|-------------------------------------|---|
| Maximum Power Consumption . . . . . | 1 VA  |
| Current Consumption . . . . .       | 50 mA   |
| Total Harmonic Distortion . . . . . | 0.005% (20 Hz – 20 kHz,<br>1 V Output)                                  |
| Frequency Response . . . . .        | 10 Hz – 75 kHz + 0,<br>–0.5 dB  |
| Signal-to-Noise Ratio . . . . .     | better than 100 dB (+ 18 dB<br>Gain)                                    |
| Reference Level . . . . .           | Gain Switch 0 dB: 1 V<br>6 dB: 0.5 V<br>12 dB: 0.25 V<br>18 dB: 0.126 V |

|                                   |   |
|-----------------------------------|---|
| Input Impedance . . . . .         | 50 kΩ                                     |
| Output Level/Output Impedance . . | 1 V/560 Ω                                 |
| Mute Function . . . . .           | Furnished                                 |
| Dimensions . . . . .              | 7-1/2(W) x 2-3/8(H) x<br>4-1/16(D) inches |
|                                   | 190(W) x 60(H) x 103(D) mm                |
| Weight . . . . .                  | 2.7 lb. 1.2 kg                            |

## System Diagram

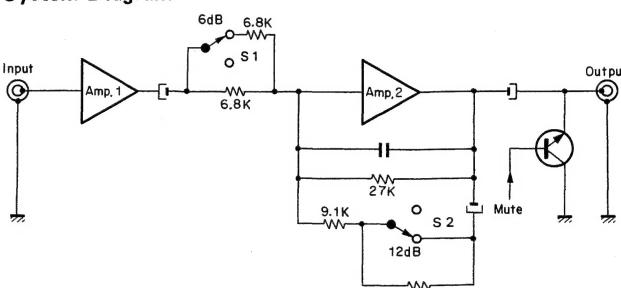


Fig. 3.1

## Schematic Diagram

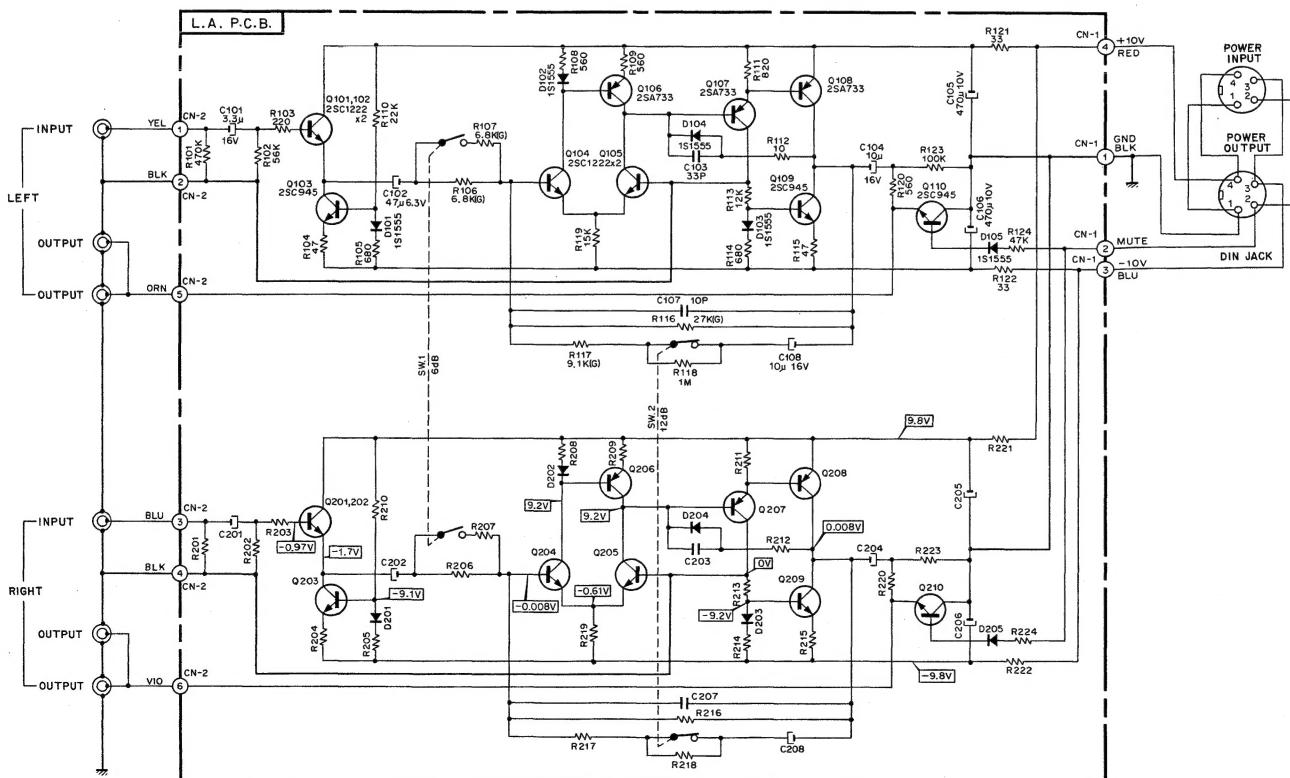


Fig. 3.2

## Mounting Diagram and Parts List

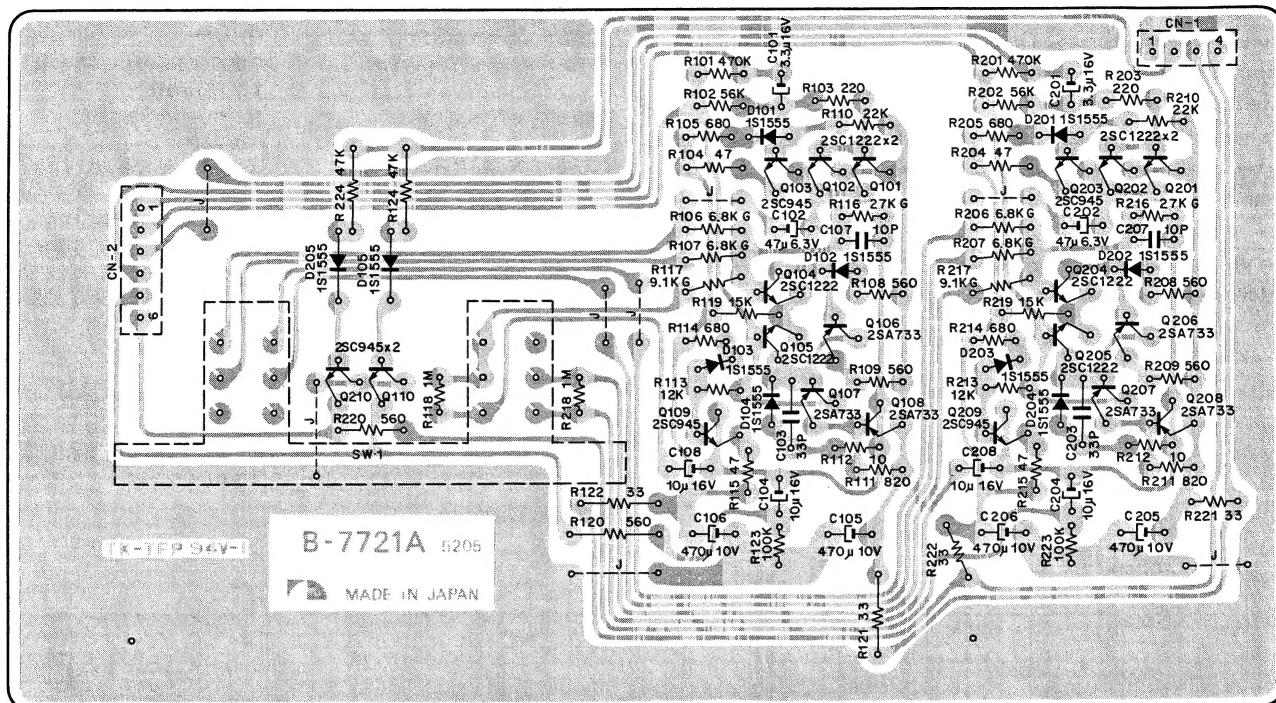


Fig. 3.3

| Schematic Ref. No.                                      | Part No. | Description                         | Schematic Ref. No. | Part No. | Description                          |
|---|----------|-------------------------------------|--------------------|----------|--------------------------------------|
| Q101,102<br>104,105<br>201,202<br>204,205               | BA03859A | LA-100 P.C.B. Ass'y                 | R110,210           | OB05661A | Carbon Resistor 22K ERD-14V J        |
|   | OB07721A | LA P.C.B.                           | R111,211           | OB05511A | Carbon Resistor 820 ERD-14V J        |
|   | OB06062A | Transistor 2SC1222 (2)              | R112,212           | OB05663A | Carbon Resistor 10 ERD-14V J         |
|   |          |                                     | R113,213           | OB05650A | Carbon Resistor 12K ERD-14V J        |
|   |          |                                     | R116,216           | OB05935A | Metal Film Resistor 27K ER0-25VK G   |
| Q103,109<br>110,203<br>209,210                          | OB01872A | Transistor 2SC945                   | R117,217           | OB05934A | Metal Film Resistor 9.1K ER0-25VK G  |
|   |          |                                     | R118,218           | OB05564A | Carbon Resistor 1M ERD-14V J         |
|   |          |                                     | R119,219           | OB05591A | Carbon Resistor 15K ERD-14V J        |
| Q106,107<br>108,206<br>207,208                          | OB06013A | Transistor 2SA733                   | R121,122           | OB05567A | Carbon Resistor 33 ERD-14V J         |
|   |          |                                     | R122,122           |          |                                      |
|   |          |                                     | R123,223           | OB01920A | Carbon Resistor 100K ERD-14V J       |
| D101,102<br>103,104<br>105,201<br>202,203<br>204,205    | OB01909A | Silicon Diode 1S1555                | R124,224           | OB05562A | Carbon Resistor 47K ERD-14V J        |
|   |          |                                     | C101,201           | OB01863A | Electrolytic Capacitor 3.3 $\mu$ 16V |
|   |          |                                     | C102,202           | OB01404A | Electrolytic Capacitor 47 $\mu$ 6.3V |
|   |          |                                     | C103,203           | OB05744A | Ceramic Capacitor 33P                |
|   |          |                                     | C104,108           | OB01412A | Electrolytic Capacitor 10 $\mu$ 16V  |
| R101,201<br>R102,202<br>R103,203<br>R104,115<br>204,215 | OB05700A | Carbon Resistor 470K ERD-14V J      | C105,106           | OB05884A | Electrolytic Capacitor 470 $\mu$ 10V |
|   | OB05563A | Carbon Resistor 56K ERD-14V J       | C107,207           | OB05798A | Ceramic Capacitor 10P                |
|   | OB05608A | Carbon Resistor 220 ERD-14V J       | SW1                | OB07170A | Push Switch SUE22                    |
|   | OB05569A | Carbon Resistor 47 ERD-14V J        | CN1                | OB08236A | 4P-T Post                            |
|   |          |                                     | CN2                | OB08182A | 6P-T Post                            |
| R105,114<br>205,214                                     | OB05559A | Carbon Resistor 680 ERD-14V J       |                    |          |                                      |
|   |          |                                     |                    |          |                                      |
|   |          |                                     |                    |          |                                      |
| R106,107<br>206,207                                     | OB05933A | Metal Film Resistor 6.8K ER0-25VK G |                    |          |                                      |
|   |          |                                     |                    |          |                                      |
| R108,109<br>120,208<br>209,220                          | OB05678A | Carbon Resistor 560 ERD-14V J       |                    |          |                                      |
|   |          |                                     |                    |          |                                      |

## Mechanism Ass'y and Parts List

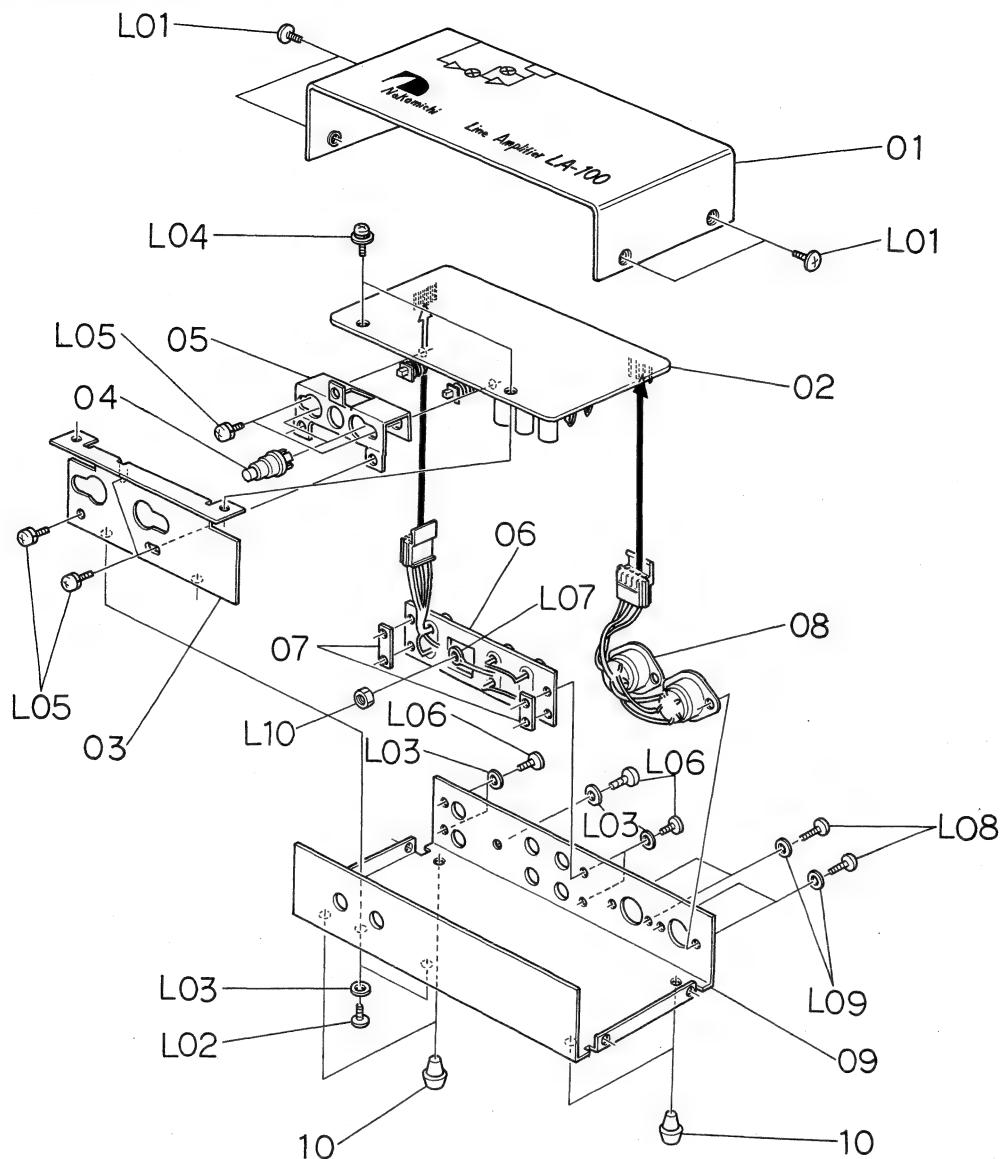


Fig. 3.4

| Schematic Ref. No. | Part No. | Description                     | Q'ty | Schematic Ref. No. | Part No. | Description                       | Q'ty |
|--------------------|----------|---------------------------------|------|--------------------|----------|-----------------------------------|------|
| 01                 | 0H03518A | LA-100 Mechanism                |      | L03                | 0E00157A | Washer 3 mm (plastics)            | 7    |
| 02                 | BA03859A | Upper Cover LA                  | 1    | L04                | 0E00606A | Screw M3x6 Philips Pan Head (3A)  | 2    |
| 03                 | 0J03654B | LA-100 P.C.B. Ass'y             | 1    | L05                | 0E00612A | Screw M3x6 Philips Pan Head (2A)  | 5    |
| 04                 | JA03061A | Front Chassis                   | 1    | L06                | 0E00594A | Screw M3x8 Philips Binding Head   | 5    |
| 05                 | 0J03440A | Push Button Ass'y               | 2    | L07                | 0E00037A | Earth Lug B-5                     | 1    |
| 06                 | OB08290B | Switch E Block Base             | 1    | L08                | 0E00714A | Screw M2.6x6 Philips Binding Head | 4    |
| 07                 | 0J03277A | 6P Pin Jack                     | 1    | L09                | 0E00651A | Washer 2.6 mm (plastics)          | 4    |
| 08                 | OB08355A | Metal Seat Nut                  | 2    | L10                | 0E00507A | Nut Hex. M3                       | 1    |
| 09                 | 0H03519A | 4P DIN Socket                   | 2    |                    |          |                                   |      |
| 10                 | 0H03437A | Main Chassis LA                 | 1    |                    |          |                                   |      |
| L01                | 0E00713A | Rubber Foot                     | 4    |                    |          |                                   |      |
| L02                | 0E00593A | Screw M3x6 Philips Truss Head   | 4    |                    |          |                                   |      |
|                    |          | Screw M3x6 Philips Binding Head | 2    |                    |          |                                   |      |

## 4. BA-150 BRIDGING ADAPTOR

## General

Except for the exclusion of power supply from BA-150, BA-150 is identical to the BA-100 presently available. Connection of BA-150 across a preamplifier and stereo power amplifiers allows the usage of stereo power amplifiers in monaural use, and delivers the power amplifier output twice the output in the stereophonic configuration. The use of Nakamichi 420 or 620 power amplifier permits the power output increase to 120W or 350W, respectively, and thus the sound quality is expected to be improved.

Transistors Q101 and Q102 in the first stage constitute an emitter follower and a constant current power supply respectively. Q104 and Q105 constitute a differential amplifier, and Q103 and D101 provide a current mirror circuit. Q106 and Q107 constitute a phase inverter and the output of Q107 is a phase-inverted signal of the input; that is, this unit, receives an input signal and outputs it as a non-inverted output and a phase-inverted output, and permits bridging of the left and right outputs of the power amplifiers to form a monaural power amplifier.

## Specifications

|                                  |  |
|----------------------------------|--|
| Maximum Power Consumption . . .  | 0.5 VA   |
| Current Consumption . . . . .    | 25 mA  |
| Reference Input Voltage . . . .  | 1 V  |
| Input Impedance . . . . .        | 10 k $\Omega$  |
| Reference Output Voltage . . . . | 1 V  |
| Output Impedance . . . . .       | 500 $\Omega$   |
| Maximum Input Voltage . . . .    | 4 V  |
| Maximum Output Voltage . . . .   | 4 V  |
| Phase-symmetry Degree . . . .    | within 1° (5 Hz – 50 kHz)  |
| Dimensions . . . . .             | 7-1/2(W) x 2-3/8(H) x 3-13/16(D) inches<br>190(W) x 60(H) x 97(D) mm |
| Weight . . . . .                 | 2.4 lb, 1.1 kg   |

## System Diagram

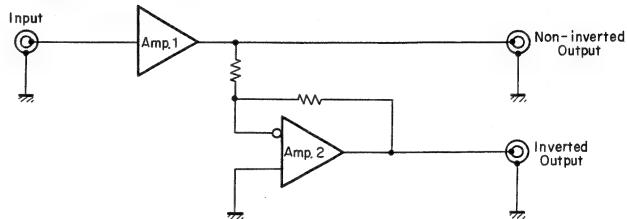


Fig. 4.1

## Schematic Diagram

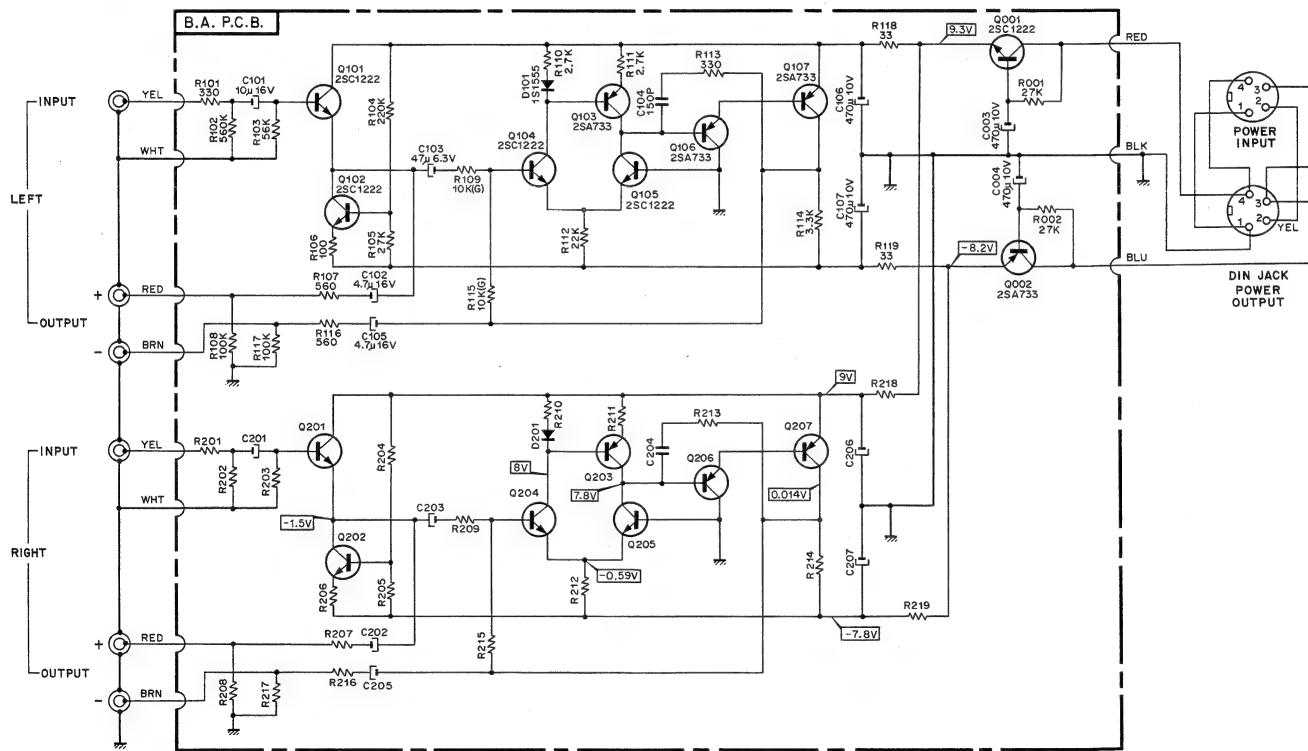


Fig. 4.2

### Mounting Diagram and Parts List

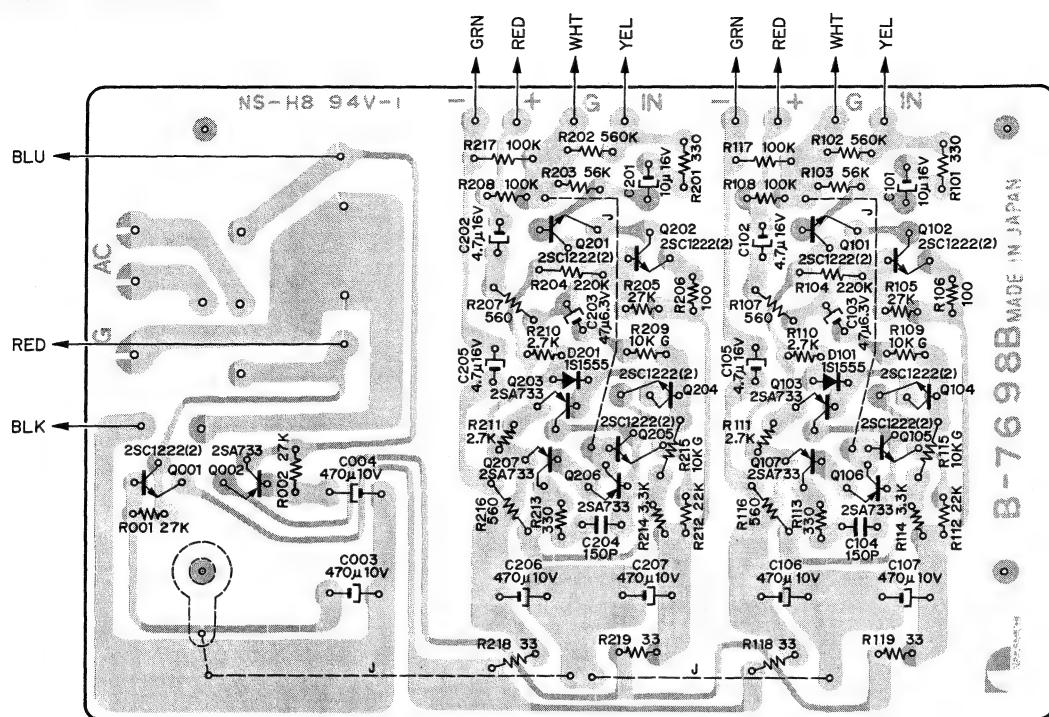


Fig. 4.3

| Schematic Ref. No.                               | Part No.             | Description                      |                         | Schematic Ref. No.                          | Part No.                         | Description                         |           |           |
|--|----------------------|----------------------------------|-------------------------|---|----------------------------------|-------------------------------------|-----------|-----------|
|  | <b>BA03863A</b>      | <b>BA-150 P.C.B. Ass'y</b>       |                         | R118,119<br>218,219                         | 0B05567A                         | Carbon Resistor                     | 33        | ERD-14V J |
| Q001,101<br>102,104<br>105,201<br>202,204<br>205 | 0B07698B<br>0B06062A | BA P.C.B.<br>Transistor          | 2SC1222 (2)             | C003,004<br>106,107<br>206,207              | 0B05884A                         | Electrolytic Capacitor              | 470 $\mu$ | 10V       |
| Q002,103<br>106,107<br>203,206<br>207            | 0B06013A             | Transistor                       | 2SA733                  | C101,201<br>C102,105<br>202,205<br>C103,203 | 0B01412A<br>0B01389A<br>0B01404A | Electrolytic Capacitor<br>10 $\mu$  | 16V       |           |
| D101,201<br>R001,002<br>105,205                  | 0B01909A<br>0B05538A | Silicon Diode<br>Carbon Resistor | 1S1555<br>27K ERD-14V J | C104,204                                    | 0B05599A<br>0E00037A             | Electrolytic Capacitor<br>4.7 $\mu$ | 16V       |           |
| R101,113<br>201,213                              | 0B01789A             | Carbon Resistor                  | 330 ERD-14V J           |   |                                  | Electrolytic Capacitor<br>47 $\mu$  | 6.3V      |           |
| R102,202   | 0B05665A             | Carbon Resistor                  | 560K ERD-14V J          |   |                                  | Ceramic Capacitor                   | 150P      | 50V       |
| R103,203   | 0B05563A             | Carbon Resistor                  | 56K ERD-14V J           |   |                                  | Earth Lug B-5                       | (1 pce.)  |           |
| R104,204   | 0B05596A             | Carbon Resistor                  | 220K ERD-14V J          |   |                                  |                                     |           |           |
| R106,206   | 0B05558A             | Carbon Resistor                  | 100 ERD-14V J           |   |                                  |                                     |           |           |
| R107,116<br>207,216                              | 0B05678A             | Carbon Resistor                  | 560 ERD-14V J           |   |                                  |                                     |           |           |
| R108,117<br>208,217                              | 0B01920A             | Carbon Resistor                  | 100K ERD-14V J          |   |                                  |                                     |           |           |
| R109,115<br>209,215                              | 0B05895A             | Metal Film Resistor              | 10K ER0-25VK<br>G       |   |                                  |                                     |           |           |
| R110,111<br>210,211                              | 0B01782A             | Carbon Resistor                  | 2.7K ERD-14V J          |   |                                  |                                     |           |           |
| R112,212   | 0B05661A             | Carbon Resistor                  | 22K ERD-14V J           |   |                                  |                                     |           |           |
| R114,214   | 0B01793A             | Carbon Resistor                  | 3.3K ERD-14V J          |   |                                  |                                     |           |           |

## Mechanism Ass'y and Parts List

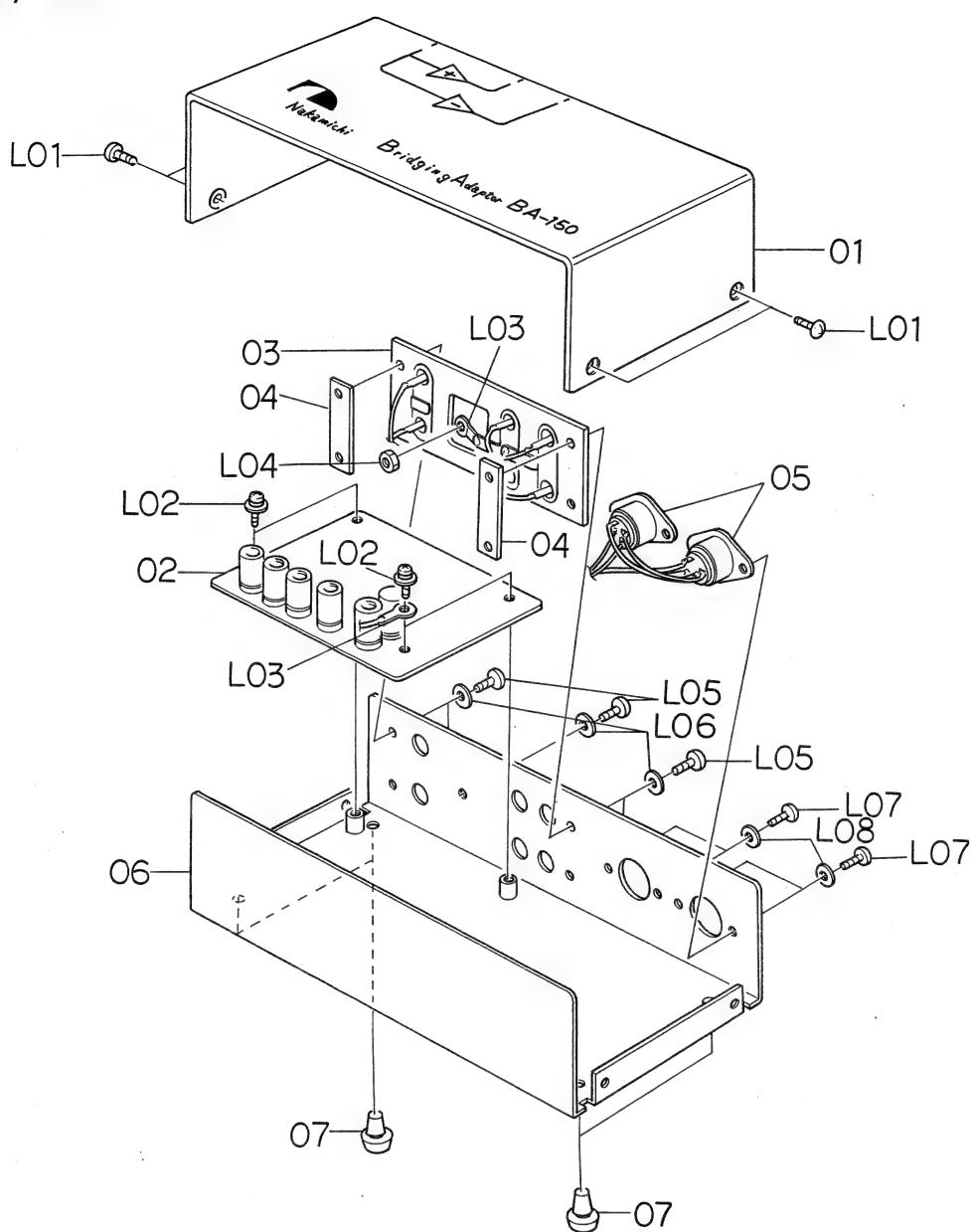


Fig. 4.4

| Schematic Ref. No. | Part No. | Description                      | Q'ty | Schematic Ref. No. | Part No. | Description                       | Q'ty |
|--------------------|----------|----------------------------------|------|--------------------|----------|-----------------------------------|------|
| 01                 | OH03523A | BA-150 Mechanism                 |      | L03                | 0E00037A | Earth Lug B-5                     | 2    |
| 02                 | BA03863A | Upper Cover BA-150               | 1    | L04                | 0E00507A | Nut Hex. M3                       | 1    |
| 03                 | OB08290B | BA-150 P.C.B. Ass'y              | 1    | L05                | 0E00594A | Screw M3x8 Philips Binding Head   | 5    |
| 04                 | OJ03277A | 6P Pin Jack                      | 1    | L06                | 0E00157A | Washer 3 mm (plastics)            | 5    |
| 05                 | OB08355A | Metal Seat Nut                   | 2    | L07                | 0E00714A | Screw M2.6x6 Philips Binding Head | 4    |
| 06                 | HA03709A | 4P DIN Socket                    | 2    | L08                | 0E00651A | Washer 2.6 mm (plastics)          | 4    |
| 07                 | OH03437A | Main Chassis BA Ass'y            | 1    |                    |          |                                   |      |
| L01                | OE00713A | Rubber Foot                      | 4    |                    |          |                                   |      |
| L02                | OE00606A | Screw M3x6 Philips Truss Head    | 4    |                    |          |                                   |      |
|                    |          | Screw M3x6 Philips Pan Head (3A) | 4    |                    |          |                                   |      |

## 5. MB-150 MC BOOSTER AMPLIFIER

### General

MB-150 is a booster amplifier used to increase gain for an MC type cartridge at low output level.

The gain can be selected at two levels of 38 dB/22 dB by switching the Gain Switch ON/OFF. With the Pass Switch set to ON, the input from the cartridge is directly delivered as the output without passing through the amplifier.

Complementary circuits used in all stages of MB-150 reduce distortion.

The first stage is composed of 10 PNP transistors and 10 NPN transistors, with low noise figures at small signal source impedance, which are connected in parallel respectively to ensure low noise figures.

The second stage adopts the particular triple transistor configuration as used in the first stage of Nakamichi 610, 410, and 630 Equalizing Amplifiers, and its equivalent input noise figure is less than -158 dB (with RIAA IHF-A Network).

The first-stage transistors have the combination of NPN and PNP. Theoretically, if the characteristics of both types are the same, the collector currents of these transistors are equal, and their base currents are the same if the current amplification  $h_{FE}$ 's are equal; therefore d.c. voltage across the input terminals vanishes at the identical values of + and - power supply voltage. In actual circuits, However, a + or - voltage slightly remains due to various factors and the voltage should be adjusted to zero by offset voltage adjustment.

### Offset Voltage Adjustment

1. Insert shorted pin plugs into input jacks of MB-150.
2. Connect a PS-100 power supply unit to the MB-150 and turn the power switch of the PS-100 ON.
3. Connect an amplifier to the output jacks and listen to sound with headphones or a speaker.
4. Adjust semi-fixed volumes VR101 and VR201 so that switching noises generated at the ON/OFF operation of the pass switch reduce to a inaudible level.

### Specifications

|   |  |
|---|--|
| Maximum Power Consumption . . .                 | 2 VA   |
| Current Consumption . . . . .                   | 100 mA   |
| Total Harmonic Distortion . . . .               | 0.005% (20 Hz - 20 kHz,<br>0.3 V Output)   |
| Frequency Response . . . . .                    | 20 Hz - 100 kHz + 0, -1 dB<br>(+ 38 dB Gain)<br>10 Hz - 100 kHz + 0,<br>-0.5 dB (+ 22 dB Gain) |
| Equivalent Input Noise . . . . .                | -158 dB (RIAA, IHF-A<br>Network)   |
| Ref. Output Level/Output<br>Impedance . . . . . | 5 mV/5.6 $\Omega$  |
| Ref. Input Level/Input Impedance .              | 0.4 mV/56 $\Omega$ (+ 22 dB Gain)<br>63 $\mu$ V/56 $\Omega$ (+ 38 dB Gain)                     |
| Maximum Input Level . . . . .                   | 200 mV (+ 22 dB Gain)<br>30 mV (+ 38 dB Gain)  |
| Dimensions . . . . .                            | 7-1/2(W) x 2-3/8(H) x<br>3-15/16(D) inches<br>190(W) x 60(H) x 100(D) mm                       |
| Weight . . . . .                                | 2.9 lb, 1.3 kg   |

### System Diagram

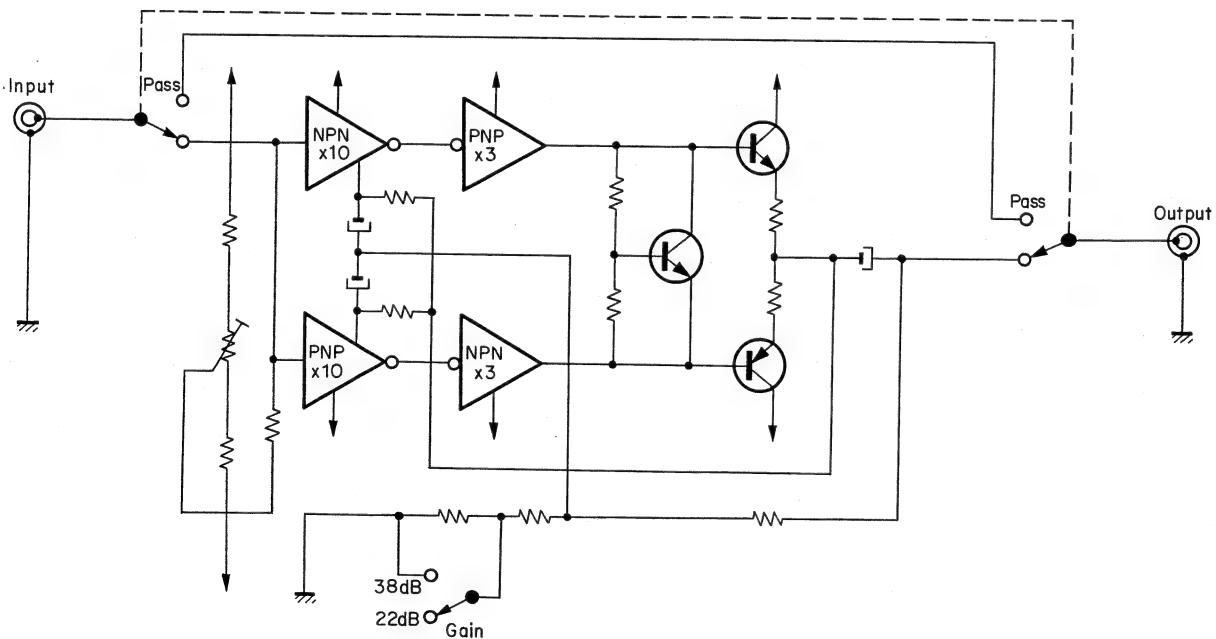


Fig. 5.1

Mechanism Ass'y and Parts List

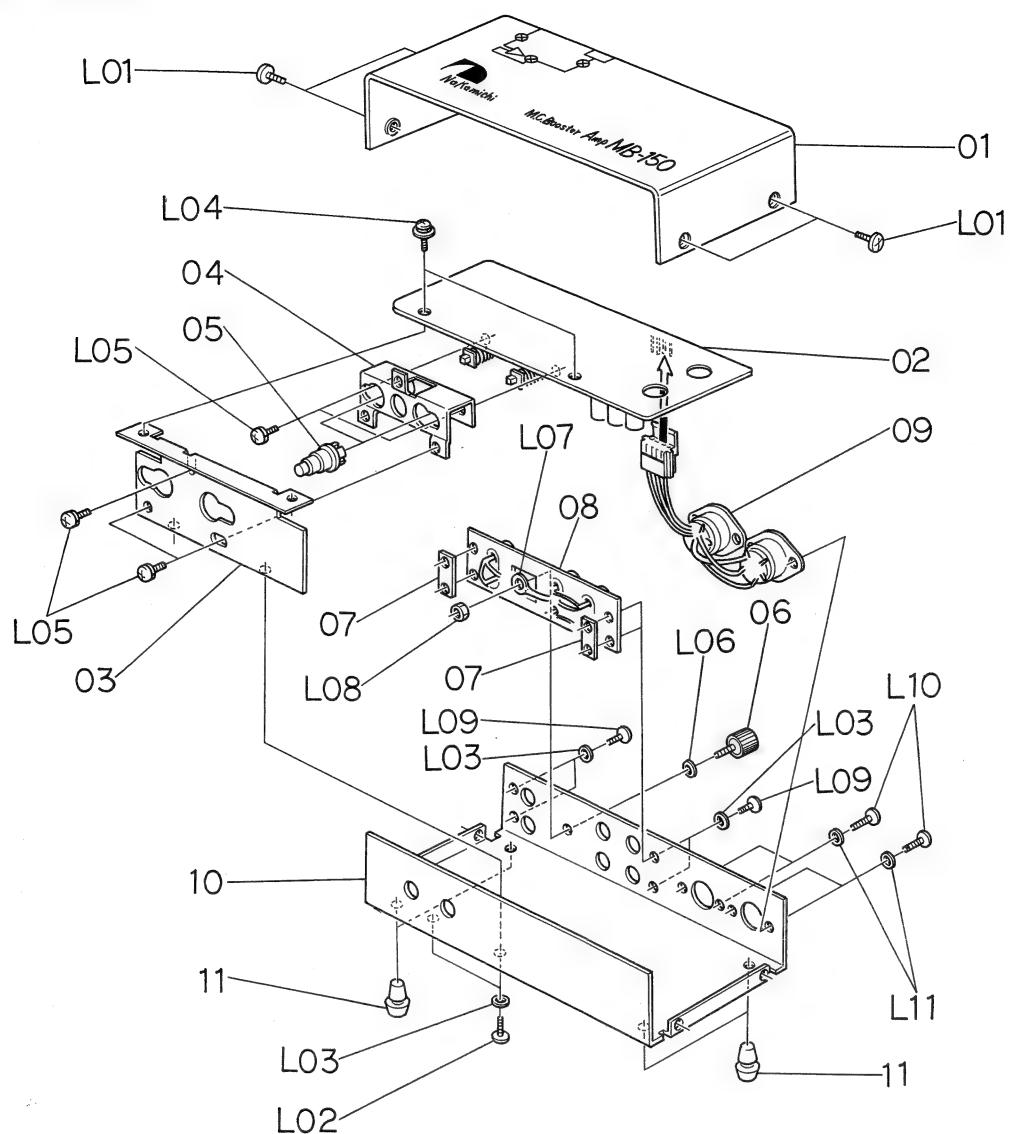


Fig. 5.2

| Schematic Ref. No. | Part No. | Description                   | Q'ty | Schematic Ref. No. | Part No. | Description                       | Q'ty |
|--------------------|----------|-------------------------------|------|--------------------|----------|-----------------------------------|------|
|                    |          | <b>MB-150 Mechanism</b>       |      | L02                | OE00593A | Screw M3x6 Philips Binding Head   | 2    |
| 01                 | OH03521A | Upper Cover MB                | 1    | L03                | OE00157A | Washer 3 mm (plastics)            | 6    |
| 02                 | BA03860A | MB-150 P.C.B. Ass'y           | 1    | L04                | OE00606A | Screw M3x6 Philips Pan Head (3A)  | 2    |
| 03                 | OJ03654B | Front Chassis                 | 1    | L05                | OE00612A | Screw M3x6 Philips Pan Head (2A)  | 5    |
| 04                 | OJ03440A | Switch E Block Base           | 1    | L06                | OE00732A | Washer 3 mm                       | 1    |
| 05                 | JA03061A | Push Button Ass'y             | 2    | L07                | OE00037A | Earth Lug B-5                     | 1    |
| 06                 | OB03920B | Ground Terminal               | 1    | L08                | OE00507A | Nut Hex. M3                       | 1    |
| 07                 | OJ03277A | Metal Seat Nut                | 2    | L09                | OE00594A | Screw M3x8 Philips Binding Head   | 4    |
| 08                 | OB08394A | 6P Pin Jack                   | 1    | L10                | OE00714A | Screw M2.6x6 Philips Binding Head | 4    |
| 09                 | OB08355A | 4P DIN Socket                 | 2    | L11                | OE00651A | Washer 2.6 mm (plastics)          | 4    |
| 10                 | OH03522C | Main Chassis MB               | 1    |                    |          |                                   |      |
| 11                 | OH03437A | Rubber Foot                   | 4    |                    |          |                                   |      |
| L01                | OE00713A | Screw M3x6 Philips Truss Head | 4    |                    |          |                                   |      |

Schematic Diagram

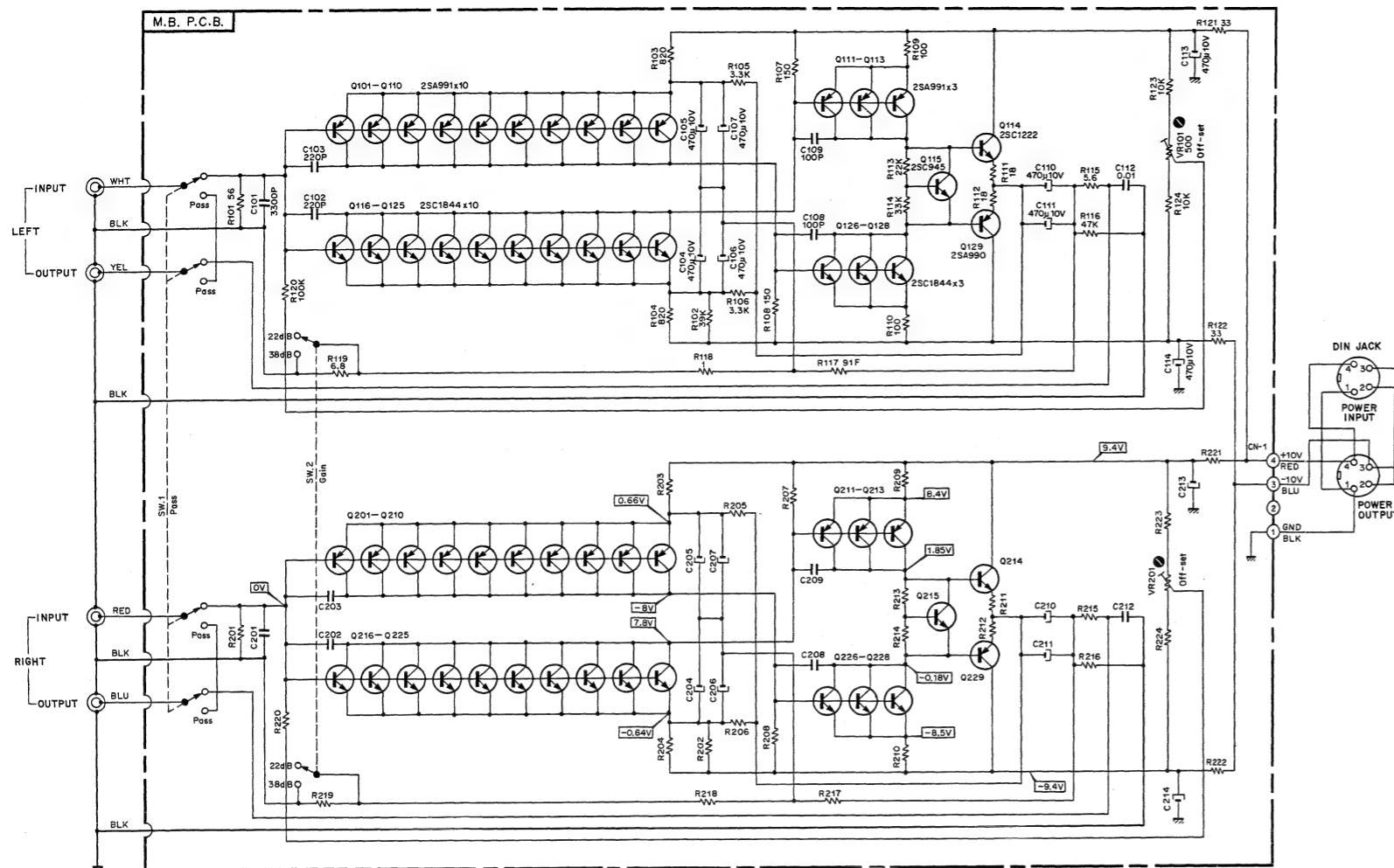


Fig. 5.3

Mounting Diagram and Parts List

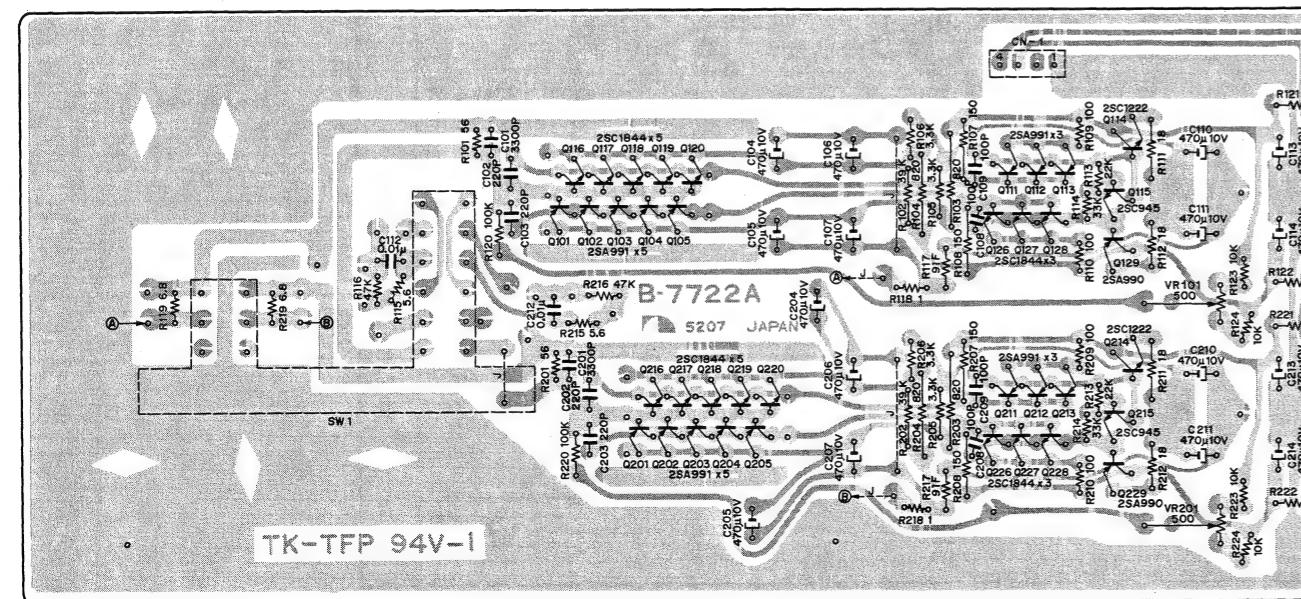


Fig. 5.4

| Schematic Ref. No.  | Part No.   | Description   |
|---|--|---|
| BA03860A  |  | MB-150 P.C.B. Ass'y   |
| Q101-113<br>201-213   | OB07722A<br>OB06120A   | MB P.C.B.<br>Transistor 2SA991 (26 pcs.)  |
| Q114,214<br>Q115,215  | OB06062A<br>OB01872A   | Transistor 2SC1222 (2)<br>Transistor 2SC945   |
| Q116-128<br>216-228   | OB06119A   | Transistor 2SC1844 (26pcs.)   |
| Q129,229<br>VR101,201   | OB06121A<br>OB07159A   | Transistor 2SA990<br>Semi-fixed Volume 500  |
| R101,201<br>R102,202  | OB05587A<br>OB01885A   | Carbon Resistor 56 ERD-25V J<br>Carbon Resistor 39K ERD-25V J   |
| R103,104<br>203,204   | OB05511A   | Carbon Resistor 820 ERD-25V J   |
| R105,106<br>205,206   | OB01793A   | Carbon Resistor 3.3K ERD-25V J  |
| R107,108<br>207,208   | OB05649A   | Carbon Resistor 150 ERD-25V J   |
| R109,110<br>209,210   | OB05558A   | Carbon Resistor 100 ERD-25V J   |
| R111,112<br>211,212   | OB05545A   | Carbon Resistor 18 ERD-25V J  |
| R113,213<br>R114,214  | OB05661A<br>OB01879A   | Carbon Resistor 22K ERD-25V J<br>Carbon Resistor 33K ERD-25V J  |
| R115,215<br>R116,216  | OB05818A<br>OB05562A   | Carbon Resistor 5.6 ERD-25V J<br>Carbon Resistor 47K ERD-25V J  |
| R117,217  | OB05952A   | Metal Film Resistor 91 ERD-25V K  |
| R118,218<br>R119,219  | OB05746A<br>OB05854A   | Carbon Resistor 1 ERD-25V J<br>Carbon Resistor 6.8 ERD-25V J  |
| R120,220<br>R121,222  | OB01920A<br>OB05567A   | Carbon Resistor 100K ERD-25V J<br>Carbon Resistor 33 ERD-25V J  |
| R123,124<br>223,224   | OB01833A   | Carbon Resistor 10K ERD-25V J   |
| C101,201<br>C102,103  | OB01914A<br>OB01289A   | Mylar Capacitor 3300P 50V<br>Ceramic Capacitor 220P 50V   |
| C104,105<br>106,107<br>110,111<br>113,114<br>204,205<br>206,207<br>210,211<br>213,214 | OB05884A   | Electrolytic Capacitor 470 $\mu$ 10V  |
| C108,109<br>208,209<br>C112,212<br>SW1<br>CN1   | OB01288A<br>OB01290A<br>OB07167A<br>OB08236A<br>OB08366A<br>OB07738A | Ceramic Capacitor 100P 50V<br>Ceramic Capacitor 0.01 $\mu$ 50V<br>Push Switch SVE<br>4P-T Post<br>Shield Case MB (2 pcs.)<br>TR P.C.B. (2 pcs.) |

(TR P.C.B.)

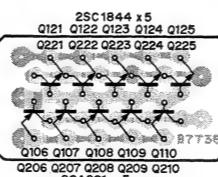


Fig 5.5

## 6. EC-100 ELECTRONIC CROSSOVER

## General

EC-100, a combination of a high-pass filter, a phase shifter and an adder, separates an input signal into a high-passed output and a low-passed output.

Each of the two output signals is delivered to a respective power amplifier for driving a 2-way speaker system.

A combination of two or more EC-100's makes it possible to drive a 3-way or 4-way speaker system.

The transfer function  $G_H(s)$  of a high pass filter is given by the formula:

$$G_H(s) = \frac{s^2}{(s + \omega_0)^2} \quad \dots \dots \dots \quad 1$$

The transfer function  $G_P(s)$  of a phase shifter is expressed as:

$$G_P(s) = -\frac{s - \omega_0}{s + \omega_0} \quad \dots \dots \dots \quad 2$$

Further, the added output (Eq. 1 + Eq. 2) of the adder is:

$$G_H(s) + G_P(s) = \frac{\omega_0^2}{(s + \omega_0)^2} \quad \dots \dots \dots \quad 3$$

The transfer function of Eq. 3 accords with that of a low pass filter circuit. Therefore the output of the adder is a signal of lower frequency range.

The crossover frequency setting of EC-100 at 19 steps from 66 Hz to 7.4 kHz is possible by adjusting the Frequency Control VR001.

The Frequency Control is interlocked at 19 frequency positions in total, including 10 positions marked on the Frequency Control and 9 positions at the middle of them. These frequencies are 66, 68, 78, 95, 120, 170, 250, 320, 370, 440, 530, 660, and 880 Hz and 1.4 k, 2.4 k, 3.9 k, 5.4 k, 7 k, and 7.4 kHz. The attenuation characteristic of the filters is 12 dB/oct.

EC-100 has the same characteristics as conventional multi-band filter circuits; however, in the crossover frequency switching system of EC-100 is improved from conventional systems that have to change the resistance and capacitance simultaneously to the system changing only the resistance.

## Specifications

|                                    |  |
|------------------------------------|--|
| Maximum Power Consumption          | 2 VA   |
| Current Consumption                | 100 mA   |
| Attenuation                        | 12 dB/oct.   |
| Crossover Frequencies              | 66, 68, 78, 95, 120, 170, 250, 320, 370, 440, 530, 660, 880 Hz, 1.4 k, 2.4 k, 3.9 k, 5.4 k, 7 k, 7.4 kHz |
| Distortion                         | less than 0.005% (20 Hz – 20 kHz)  |
| Signal-to-Noise Ratio              | better than 110 dB (IHF-A Network)   |
| Ref. Input Level/Input Impedance   | 1 V/50 kΩ  |
| Ref. Output Level/Output Impedance | 1 V/560 Ω  |
| Maximum Input Level                | 4 V  |
| Mute Function                      | Furnished  |
| Dimensions                         | 7-1/2(W) x 2-3/8(H) x 3-15/16(D) inches<br>190(W) x 60(H) x 100(D) mm                                    |
| Weight                             | 2.4 lb, 1.1 kg   |

## System Diagram

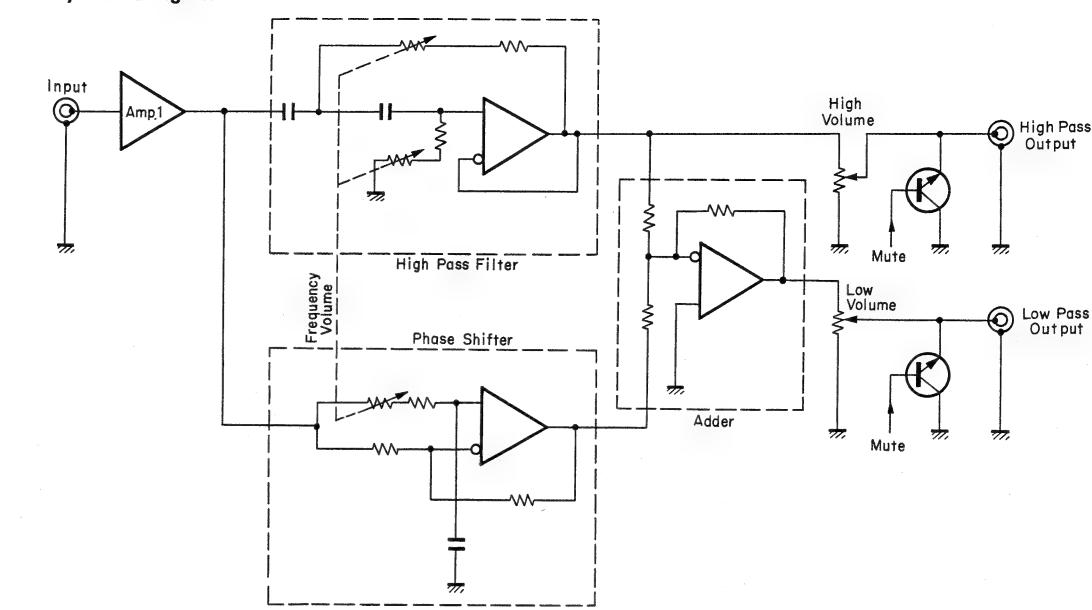


Fig. 6.1

## Schematic Diagram

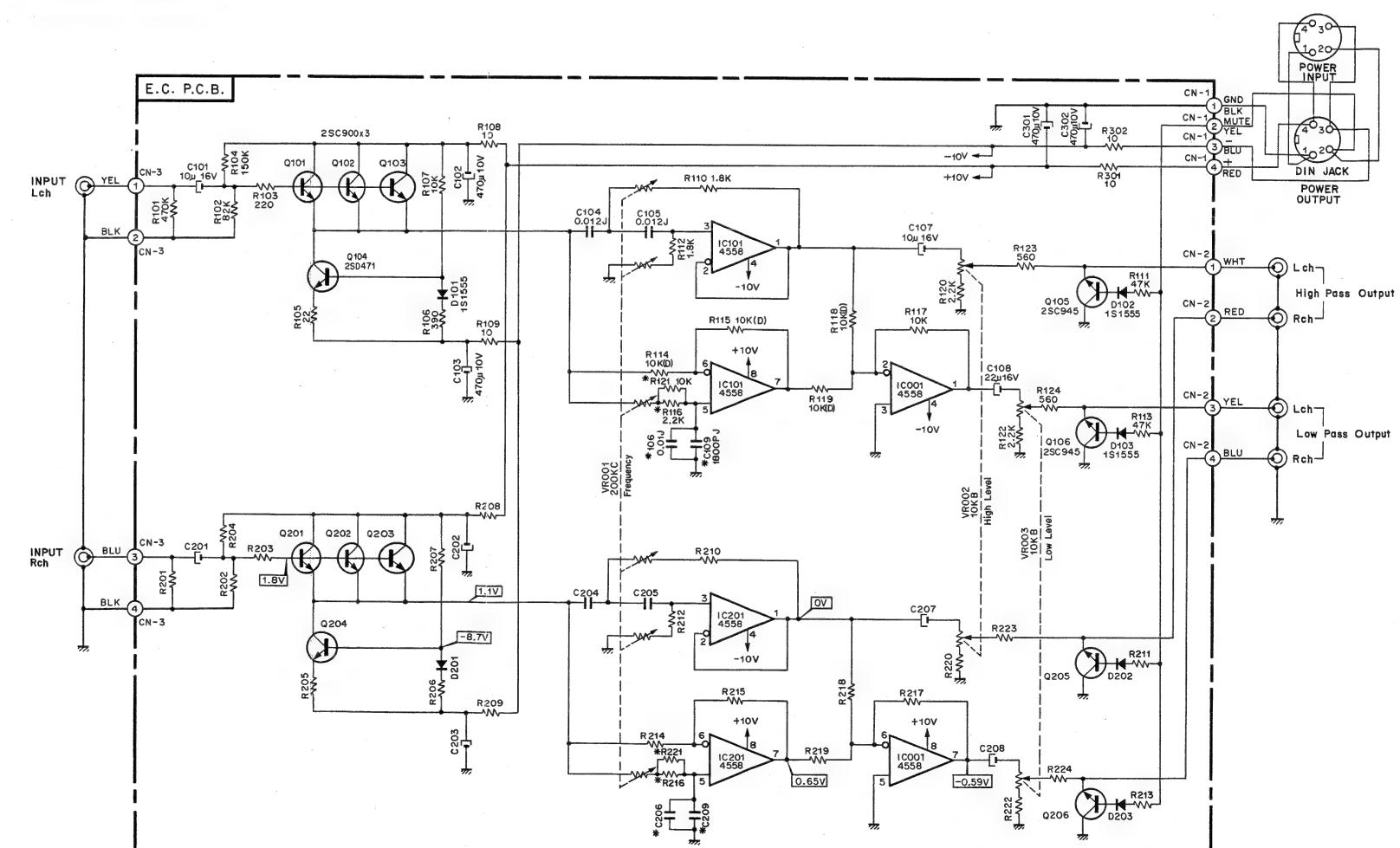


Fig. 6.2

## Note:

Resistors and capacitors marked with \* will be adjusted in order to achieve accurate crossover frequencies when frequency volume is interlocked at 19 positions.

The standard value of these resistors and capacitors are shown in the figure.

## Mounting Diagram and Parts List

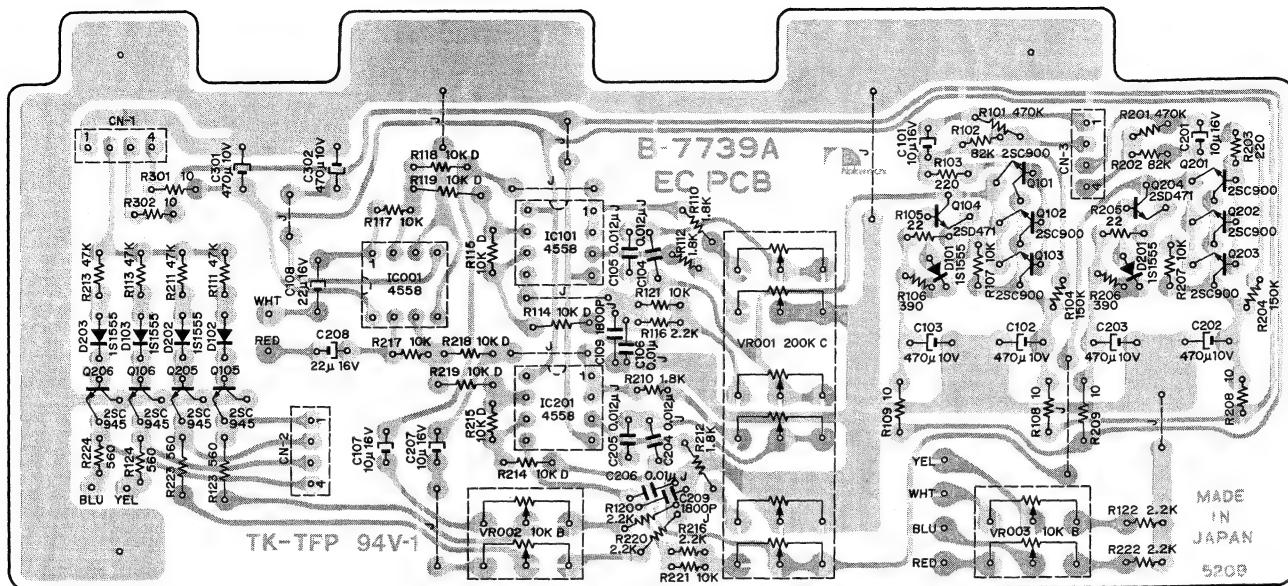


Fig. 6.3

| Schematic Ref. No.             | Part No. | Description         |                | Schematic Ref. No.             | Part No. | Description            |        |            |
|--------------------------------|----------|---------------------|----------------|--------------------------------|----------|------------------------|--------|------------|
|                                | BA03868A | EC-100 P.C.B. Ass'y |                | R114,115<br>118,119            | OB05955A | Metal Film Resistor    | 10K    | ER0-25VK D |
| IC001,101<br>201               | OB07739B | EC P.C.B.           |                | 214,215                        |          |                        |        |            |
|                                | OB06124A | IC                  | 4558           | 218,219                        |          |                        |        |            |
| Q101,102<br>103,201<br>202,203 | OB01910A | Transistor          | 2SC900 (E)     | R116,120<br>122,216<br>220,222 | OB05566A | Carbon Resistor        | 2.2K   | ERD-25V J  |
| Q104,204                       | OB06066A | Transistor          | 2SD471         | R123,124<br>223,224            | OB05678A | Carbon Resistor        | 560    | ERD-25V J  |
| Q105,106<br>205,206            | OB01872A | Transistor          | 2SC945         | C101,107<br>201,207            | OB01412A | Electrolytic Capacitor |        |            |
| D101,102<br>103,201<br>202,203 | OB01909A | Silicon Diode       | 1S1555         | C102,103<br>202,203<br>301,302 | OB05884A | Electrolytic Capacitor |        |            |
| VR001                          | OB07182A | Volume              | 200K (C)       | C104,105                       | OB05843A | Mylar Capacitor        | 0.012μ | J          |
| VR002,003                      | OB07181A | Volume              | 10K (B)        | 204,205                        |          |                        |        |            |
| R101,201                       | OB05700A | Carbon Resistor     | 470K ERD-25V J | C106,206                       | OB05681A | Mylar Capacitor        | 0.01μ  | J          |
| R102,202                       | OB01564A | Carbon Resistor     | 82K ERD-25V J  | C108,208                       | OB01862A | Electrolytic Capacitor |        |            |
| R103,203                       | OB05608A | Carbon Resistor     | 220 ERD-25V J  |                                |          |                        | 22μ    | 16V        |
| R104,204                       | OB05593A | Carbon Resistor     | 150K ERD-25V J | C109,209                       | OB01913A | Mylar Capacitor        | 1800P  | J          |
| R105,205                       | OB05606A | Carbon Resistor     | 22 ERD-25V J   | CN1,2,3                        | OB08236A | 4P-T Post              |        |            |
| R106,206                       | OB05688A | Carbon Resistor     | 390 ERD-25V J  |                                |          |                        |        |            |
| R107,117<br>121,207<br>217,221 | OB01833A | Carbon Resistor     | 10K ERD-25V J  |                                |          |                        |        |            |
| R108,109<br>208,209<br>301,302 | OB05663A | Carbon Resistor     | 10 ERD-25V J   |                                |          |                        |        |            |
| R110,112<br>210,212            | OB01830A | Carbon Resistor     | 1.8K ERD-25V J |                                |          |                        |        |            |
| R111,113<br>211,213            | OB05641A | Carbon Resistor     | 47K ERD-25V J  |                                |          |                        |        |            |

Mechanism Ass'y and Parts List

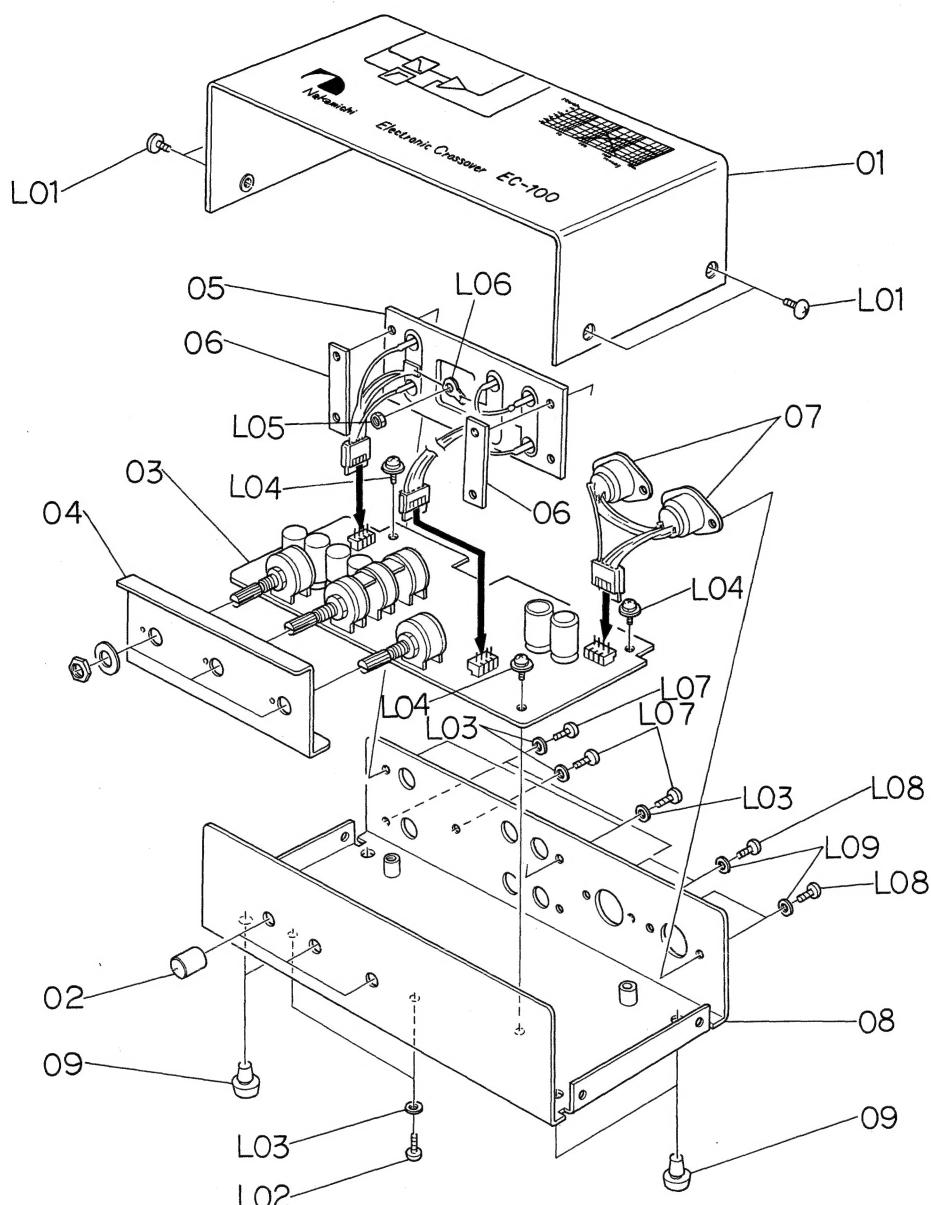


Fig. 6.4

| Schematic Ref. No. | Part No. | Description                   | Q'ty | Schematic Ref. No. | Part No. | Description                       | Q'ty |
|--------------------|----------|-------------------------------|------|--------------------|----------|-----------------------------------|------|
|                    |          | <b>EC-100 Mechanism</b>       |      | L02                | 0E00593A | Screw M3x6 Philips Binding Head   | 2    |
| 01                 | 0H03528A | Upper Cover EC                | 1    | L03                | 0E00157A | Washer 3 mm (plastics)            | 7    |
| 02                 | HA03714A | VR Knob Ass'y                 | 3    | L04                | 0E00606A | Screw M3x6 Philips Pan Head (3A)  | 3    |
| 03                 | BA03868A | EC-100 P.C.B. Ass'y           | 1    | L05                | 0E00507A | Nut Hex. M3                       | 1    |
| 04                 | 0J03689B | VR Holder MX                  | 1    | L06                | 0E00037A | Earth Lug B-5                     | 1    |
| 05                 | 0B08290B | 6P Pin Jack                   | 1    | L07                | 0E00594A | Screw M3x8 Philips Binding Head   | 5    |
| 06                 | 0J03277A | Metal Seat Nut                | 2    | L08                | 0E00714A | Screw M2.6x6 Philips Binding Head | 4    |
| 07                 | 0B08355A | 4P DIN Socket                 | 2    | L09                | 0E00651A | Washer 2.6 mm (plastics)          | 4    |
| 08                 | HA03713A | Main Chassis EC Ass'y         | 1    |                    |          |                                   |      |
| 09                 | 0H03437A | Rubber Foot                   | 4    |                    |          |                                   |      |
| L01                | 0E00713A | Screw M3x6 Philips Truss Head | 4    |                    |          |                                   |      |

## 7. MX-100 MICROPHONE MIXER

### General

MX-100 is a mixing unit having three microphone inputs for L-channel, R-channel, and Blend. In addition to the use as a simple microphone mixer connected to line input terminals on a tape deck, the unit allows the application to a PA (public address) amplifier directly connected to an Aux. input of a preamplifier, etc.

Further, connection of this unit to Nakamichi 600 (a cassette console) makes microphone recording by Nakamichi 600 possible.

In addition, connection to the line input of a cassette system, such as Nakamichi 700II, 1000II or 500, allows recording using six microphones.

In Fig. 7.1, the gain of the L-channel microphone amplifier is given by the formula:

$$Av(L) = \frac{Ry_1}{R_1 + Rx_1 + Ry_1} \quad \dots \dots \dots \quad 1$$

and the gain of blend microphone amplifier:

$$Av(B) = \frac{Ry_2}{R_2 + Rx_2 + Ry_2} \quad \dots \dots \dots \quad 2$$

The gains of the mixing amplifier:

$$Av(ML) = R_5/R_3 \text{ (for L-channel mic. amp. output),}$$

$$Av(MB) = R_5/R_4 \text{ (for Blend mic. amp. output).}$$

### System Diagram

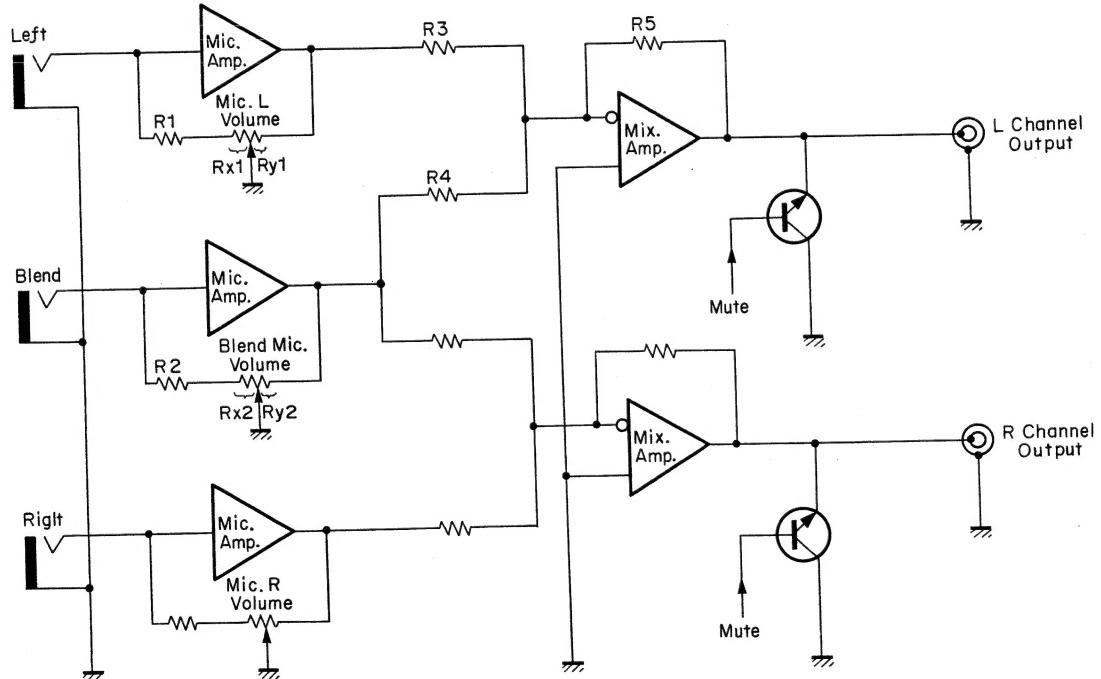


Fig. 7.1

Therefore the output of the L-channel is expressed as:

$$Av(LO) = Av(L) \frac{R_5}{R_3} + Av(B) \frac{R_5}{R_4}$$

Similar to the L-channel, the signal of blend microphone is mixed in the R-channel.

### Specifications

|                                     |   |
|-------------------------------------|---|
| Maximum Power Consumption . . . . . | 1 VA  |
| Current Consumption . . . . .       | 50 mA                                       |
| Total Harmonic Distortion . . . . . | 0.05% (10 kHz, 1 V Output,<br>1 V Input)    |
| Input Sensitivity . . . . .         | 0.2 mV                                      |
| Input Impedance . . . . .           | 10 kΩ                                       |
| Output Level/Output Impedance . . . | 100 mV/560 Ω                                |
| Maximum Input Level . . . . .       | 1 V (+74 dB)                                |
| Mute Function . . . . .             | Furnished                                   |
| Dimensions . . . . .                | 7-1/2(W) x 3-3/8(H) x<br>4-5/16(D) inches   |
| Weight . . . . .                    | 190(W) x 60(H) x 110(D)mm<br>2.7 lb, 1.2 kg |

## Schematic Diagram

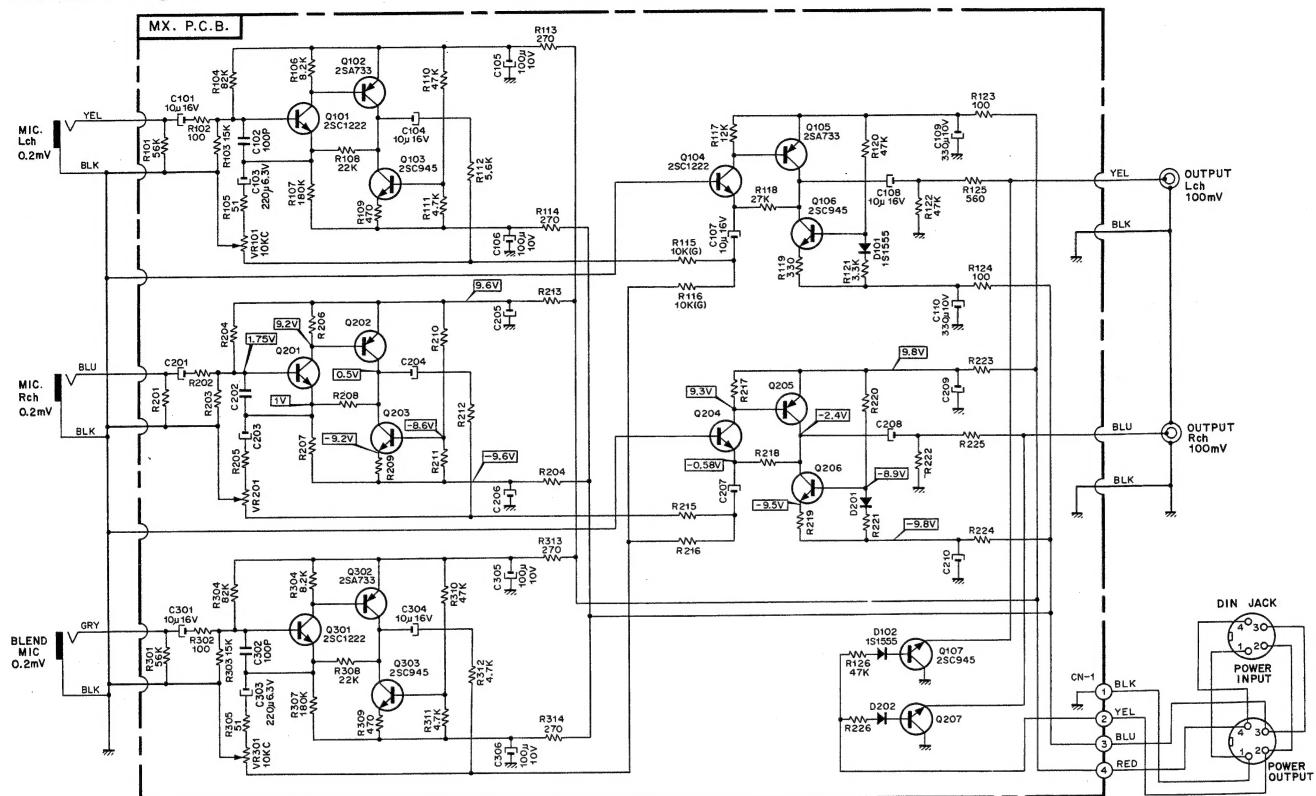


Fig. 7.2

## Mounting Diagram and Parts List

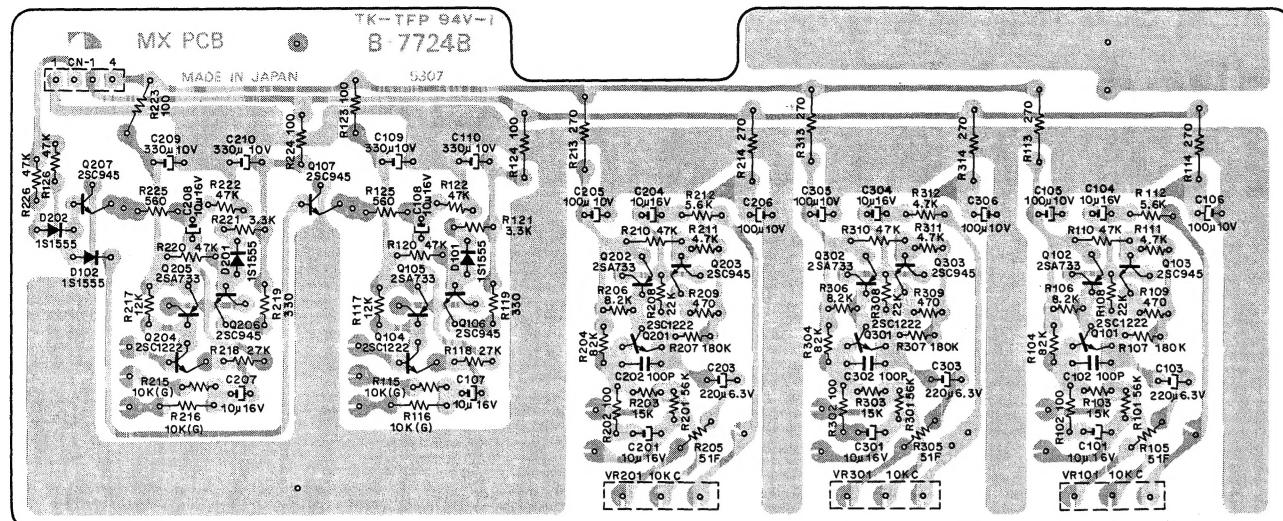


Fig. 7.3

## Mechanism Ass'y and Parts List

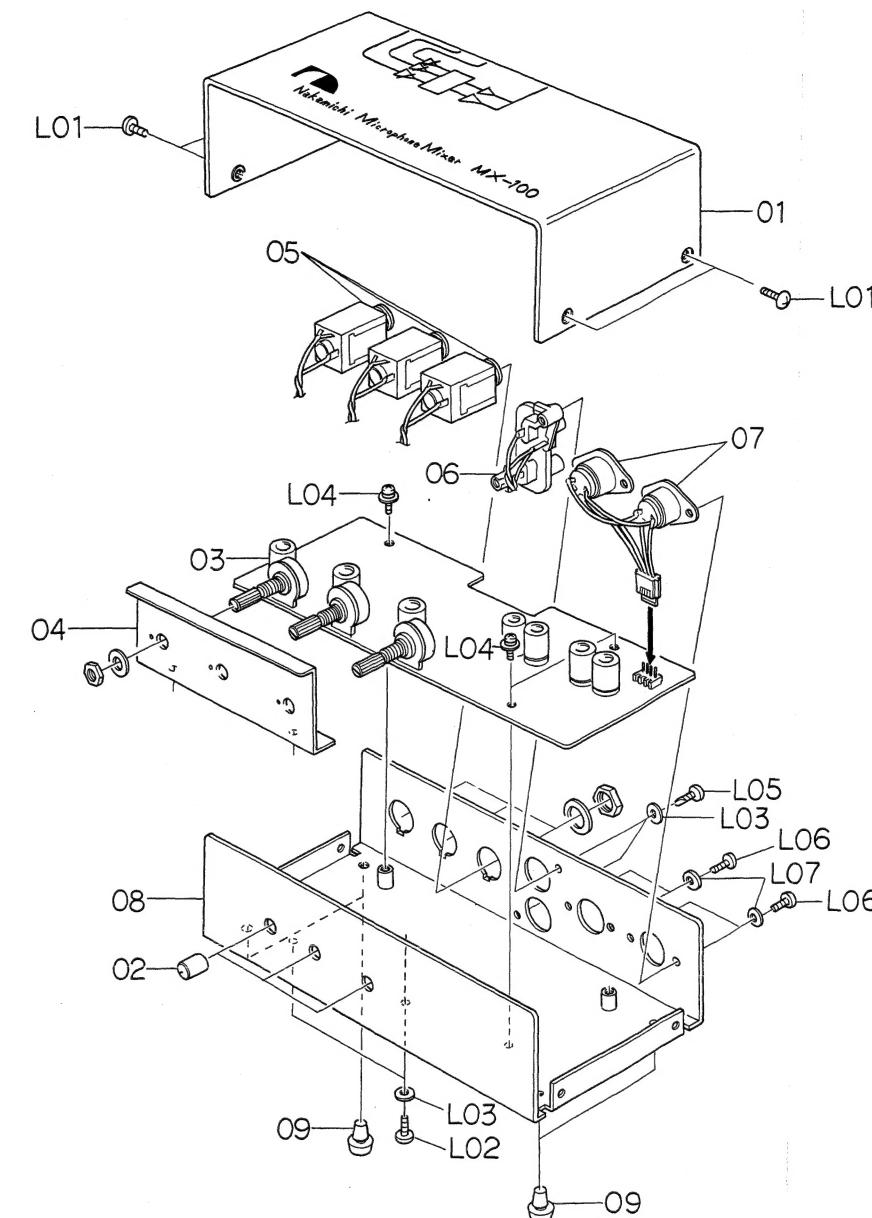


Fig. 7.4

| Schematic Ref. No.                    | Part No. | Description                       | Schematic Ref. No.                        | Part No. | Description                           |
|---------------------------------------|----------|-----------------------------------|---|----------|---------------------------------------|
| Q101,104<br>201,204<br>301            | BA03866A | MX-100 P.C.B. Ass'y               | R109,209<br>309                           | OB01792A | Carbon Resistor 470 ERD-14V J         |
| Q102,105<br>202,205<br>302            | OB06062A | MX P.C.B. Transistor 2SC1222 (2)  | R110,120<br>122,126<br>210,220<br>222,226 | OB05562A | Carbon Resistor 47K ERD-14V J         |
| Q103,106<br>107,203<br>206,207<br>303 | OB06013A | Transistor 2SA733                 | 310                                       | OB01795A | Carbon Resistor 4.7K ERD-14V J        |
| D101,102<br>201,202                   | OB01872A | Transistor 2SC945                 | R111,211<br>311,312                       | OB05673A | Carbon Resistor 5.6K ERD-14V J        |
| VR101,201<br>301                      | OB01909A | Silicon Diode 1S1555              | R112,212<br>R113,114                      | OB05645A | Carbon Resistor 270 ERD-14T J         |
| R101,201<br>301                       | OB07175A | Volume 10K (C)                    | R115,116<br>215,216                       | OB05895A | Metal Film Resistor 10K ERD-25VK G    |
| R102,123<br>124,202<br>223,224<br>302 | OB05563A | Carbon Resistor 56K ERD-14V J     | R117,217                                  | OB05650A | Carbon Resistor 12K ERD-14V J         |
| R103,203<br>303                       | OB05558A | Carbon Resistor 100 ERD-14V J     | R118,218                                  | OB05538A | Carbon Resistor 27K ERD-14V J         |
| R104,204<br>304                       | OB05591A | Carbon Resistor 15K ERD-14V J     | R119,219                                  | OB01789A | Carbon Resistor 330 ERD-14V J         |
| R105,205<br>305                       | OB01564A | Carbon Resistor 82K ERD-14V J     | R121,221                                  | OB01793A | Carbon Resistor 3.3K ERD-14V J        |
| R106,206<br>306                       | OB05847A | Metal Film Resistor 51 ERO-25VK F | R125,225                                  | OB05678A | Carbon Resistor 560 ERD-14V J         |
| R107,207<br>307                       | OB01878A | Carbon Resistor 8.2K ERD-14V J    | C101,104                                  |          | Electrolytic Capacitor 10 $\mu$ 16V   |
| R108,208<br>308                       | OB05669A | Carbon Resistor 180K ERD-14V J    | 107,108<br>201,204                        | OB01412A |                                       |
|                                       | OB05661A | Carbon Resistor 22K ERD-14V J     | 207,208<br>301,304                        |          |                                       |
|                                       |          |                                   | 302                                       | OB01288A | Ceramic Capacitor 100P                |
|                                       |          |                                   | C103,203                                  | OB01394A | Electrolytic Capacitor 220 $\mu$ 6.3V |
|                                       |          |                                   | C105,106                                  | OB05885A | Electrolytic Capacitor 100 $\mu$ 10V  |
|                                       |          |                                   | C109,110                                  | OB05841A | Electrolytic Capacitor 330 $\mu$ 10V  |
|                                       |          |                                   | CN1                                       | OB08236A | 4P-T Post                             |

| Schematic Ref. No. | Part No. | Description         | Q'ty | Schematic Ref. No. | Part No. | Description                        | Q'ty |
|--------------------|----------|---------------------|------|--------------------|----------|------------------------------------|------|
| 01                 | 0H03526A | MX-100 Mechanism    | 1    | L02                | 0E00593A | Screw M3x6 Philips Binding Head    | 2    |
| 02                 | HA03714A | Upper Cover MX      | 1    | L03                | 0E00157A | Washer 3 mm (plastics)             | 4    |
| 03                 | BA03866A | VR Knob Ass'y       | 3    | L04                | 0E00606A | Screw M3x6 Philips Pan Head (3A)   | 3    |
| 04                 | OJ03689B | MX-100 P.C.B. Ass'y | 1    | L05                | 0E00766A | Screw M3x8 Philips Binding Head TP | 2    |
| 05                 | OB03882A | VR Holder MX        | 1    | L06                | 0E00714A | Screw M2.6x6 Philips Binding Head  | 4    |
| 06                 | OB08362A | Headphone Jack      | 3    | L07                | 0E00651A | 4P DIN Socket                      | 4    |
| 07                 | OB08355A | 2P Pin Jack         | 1    |                    | HA03711A | Main Chassis MX Ass'y              | 1    |
| 08                 | OB08355A | 4P DIN Socket       | 2    |                    | 0H03437A | Rubber Foot                        | 4    |
| 09                 | OB08236A | Headphone Jack      | 4    |                    | 0E00713A | Screw M3x6 Philips Truss Head      | 4    |